JOURNEYMAN INTERNATIONAL : DWELL BEING JONESTOWN, MISSISSIPPI

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SECTION 1.0 : REPORT OVERVIEW

ABSTRACT

Journeyman International is a non-profit organization that works with countries all over the world to support humanitarian projects by pairing clients with design professionals and volunteers to oversee the design and construction of projects. This specific project partners with Third Lens Ministries and But God Ministries, two organizations that are hoping to empower the community in Jonestown, Mississippi. Dwell Being promotes sustainability and affordable housing in a new housing community in Jonestown that is designed for healthy living and community interaction. Jonestown is a very small 0.4 square acre town that has roots in systemic racism and oppression. A once very prosperous agricultural area now lacks basic resources and has an alarming poverty rate of almost 50 percent. The home structure will be apart of a community that incorporates shared lawns, gardens, and other spaces promoting outdoor activity. The structure follows a classic southern dogtrot style house with two housing spaces connected by a breezeway. A clearstory creates a high roof and a low roof and thus disconnects the living spaces from the private spaces. The high roof includes a loft for additional living or sleeping space. The advantage of a duplex style home is the ability to have multiple households of a multi-generational household. This is important because of the low mobility out of Jonestown. The increase in housing promotes ownership and participation in a stagnant community. Additionally, this report includes a research portion for a possible solution to increase the affordability and access to Dwell Being by converting it to a manufactured home.

IMPACT : GLOBAL

The global impact this project provides can be found in its goals to find affordable housing solutions. The United States Department of Housing and Urban Development defines the affordability of housing based on a 30 percent rule, meaning that housing should take up 30 percent or less of an individuals salary. In the United States today this is nearly impossible. For a community such as Jonestown experiencing such a high rate of poverty and low rate of mobility, it is extremely important to address housing issues. As new

technologies contribute to the increase in standards of across America and the world, the ability to afford housing decreases. The concluding research report proposes a solution idea to use manufactured housing instead of onsite construction. If widely accepted, this could realistically be a possible solution to increase housing affordability, especially for large development projects such as this one in Jonestown.

IMPACT : CULTURAL

For a town that has a population that is 100 percent African American, the cycles of poverty and stagnation are evidence of racism and oppression. Currently Jonestown has a lower rate of high school graduation (68.6%) than the rest of Mississippi (85.3%), more than double the rate of poverty than in Mississippi (43% and 20%), and has less than half the median household income in Mississippi (\$17K and \$45K). These factors make it very hard for residents to move outside of Jonestown to seek better opportunities and routes for success. This project being a part of a greater community development helps to foster relations among residents of Jonestown to share ideas and create relationships. This is important in pursuing interaction within the community and outside the community. The increase in manufactured homes would be quite possible in Jonestown as already, 22 percent of the homes there are manufactured. The stigma that manufactured homes are unaesthetic and symbols of poverty is disproved by the ability to design very nice manufactured home designs. The classic mobile home trailer can be replaced by a more modern family home with large windows and a sloped roof.

IMPACT : SOCIAL

This community design creates pocket neighborhoods with homes that share lawns, gardens, and recreational facilities to promote healthy living and interaction. Additionally, residents in Jonestown suffer from food insecurity despite Mississippi being an agriculturally driven state. Community gardens will help to provide locally sourced food at a cheaper cost. The new development will ideally encourage people to move to Jonestown

and therefore boost the local economy. The development of new homes will also increase home ownership which is an important step in overcoming poverty.

IMPACT : ENVIRONMENTAL

One of the goals of Dwell Being is to create as sustainable a project as possible. A solution to this is to utilize hempcrete for insulation. Hemp is a fast growing and a carbon sequestering natural building material that when mixed with lime and water creates a durable insulator to use as infill in structural framing. Hempcrete can be left unfinished or easily finished with plaster. For a very humid Delta region, this material can also help with regulating the high temperatures and humidity experienced in Jonestown. This project utilizes an empty plot of land, thus no wildlife or trees have to be removed in order for the development to occur. The project incorporates solar paneling systems to help reduce energy consumption. The clearstory separating the high roof from the low roof provides natural light to avoid unnecessary use of electricity. These details help to make a more environmentally friendly and energy efficient home for residents in Jonestown.

IMPACT : ECONOMIC

The main goal of this project is to create an affordable housing solution for the impoverished community of Jonestown. The ability to serve multiples households or a single multi-generational household in the duplex allows for the most economic efficiency. For unoccupied units, owners could lease the space for additional units. Smaller units could also function as a workspace. The affordability is further increased with manufactured homes. Detailed research at the end of this report outlines the significant impact that manufactured housing has for the ability of people that have access to more affordable housing. By having the project built on site, about 40 percent of people in Jonestown cannot comfortably afford it. However by using a manufactured model, this percentage is cut in half.

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PERSONAL REFLECTION

One of my main goals as a college graduate is to use my Architectural Engineering degree to help people. I aspire to apply my engineering practicality to address real world issues that cannot necessarily be solved by codes or calculations. This project gave me the opportunity to use what I have learned to participate in a project that seeks to find sustainable and affordable housing solutions. The most significant thing I realized is that as engineers we are already conditioned to determine the most efficient and practical solution. The most economically efficient solution has already been found and that is what we use. I learned that by thinking out of the box and suggested a more unconventional idea, that my desire to actually be more economical is possible. The biggest challenge with this project was communicating with different disciplines virtually. Typically we are taught that this is already the most difficult aspect of working in the real world. With the pandemic, this was heightened. Typically affordable housing is not the primary goal. While communicating with the architect on many occasions I had to remind her that some of her design ideas would make it more difficult to me to create an affordable structural design. For example, we struggled to decide on a foundation system that was easy to construct and did not lead to more issues such as flooding. After taking a Google Maps tour through Jonestown, I saw that the majority of the structures had simple slab on grade foundations. While these systems are not the most effective with potential flooding, the implementation of gardens and landscaping can help to decrease over saturation of water. The research component was most valuable to me because I was able to see the impact of poverty on the ability to find housing. For a project designed to address affordable housing issues, it was estimated to actually be quite expensive. I enjoyed the opportunity to analyze the significance of housing that is actually affordable and how little of these homes there actually are.

TEAM REFLECTION

The team members for this project include Margy Maher, a fifth year Architecture major, Joshua de Mattei, a fourth year Construction Management major, and myself. We all had

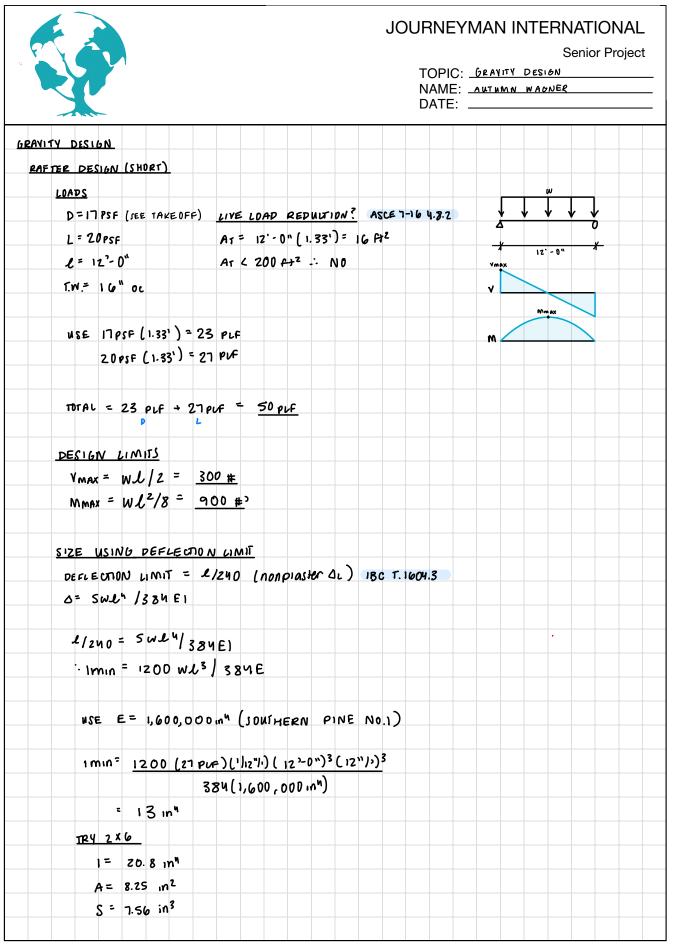
very similar goals in mind for this project. Our biggest issue was lack of communication and consistent meetings to overview progress and changes. This is an important lesson as we enter industry. Overall I would assign out group a 3.75 rating out of 5 for our lack of consistent coordination and peer review. **SECTION 2.0 : CALCULATION PACKAGE**



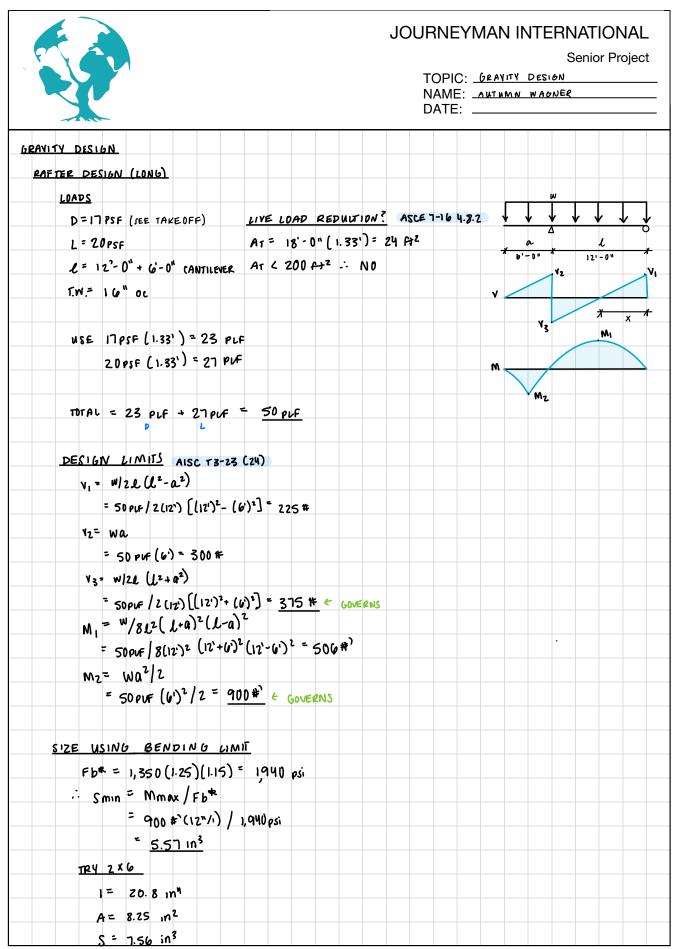
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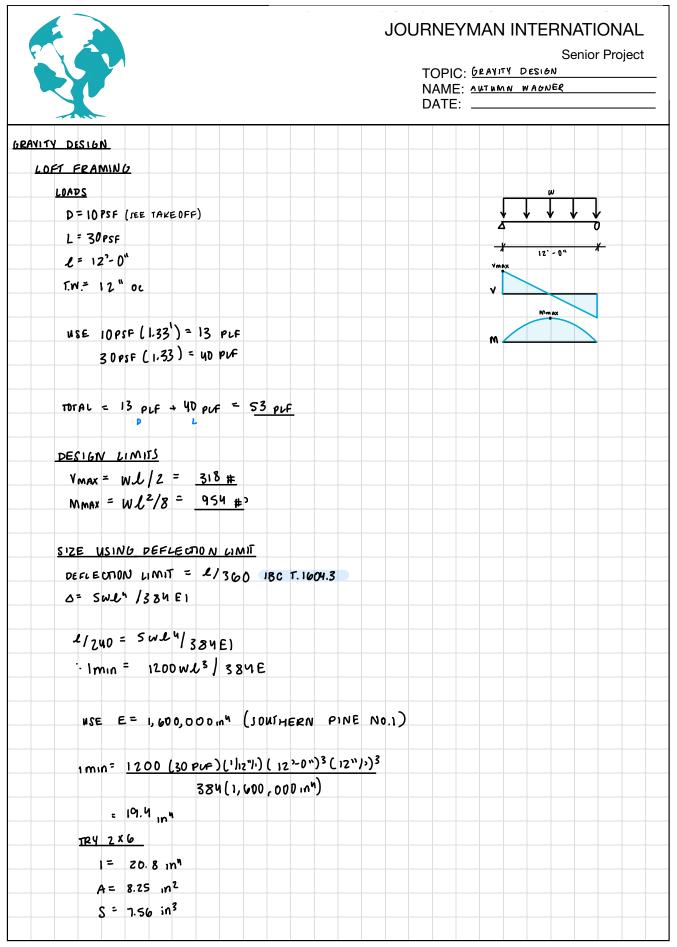
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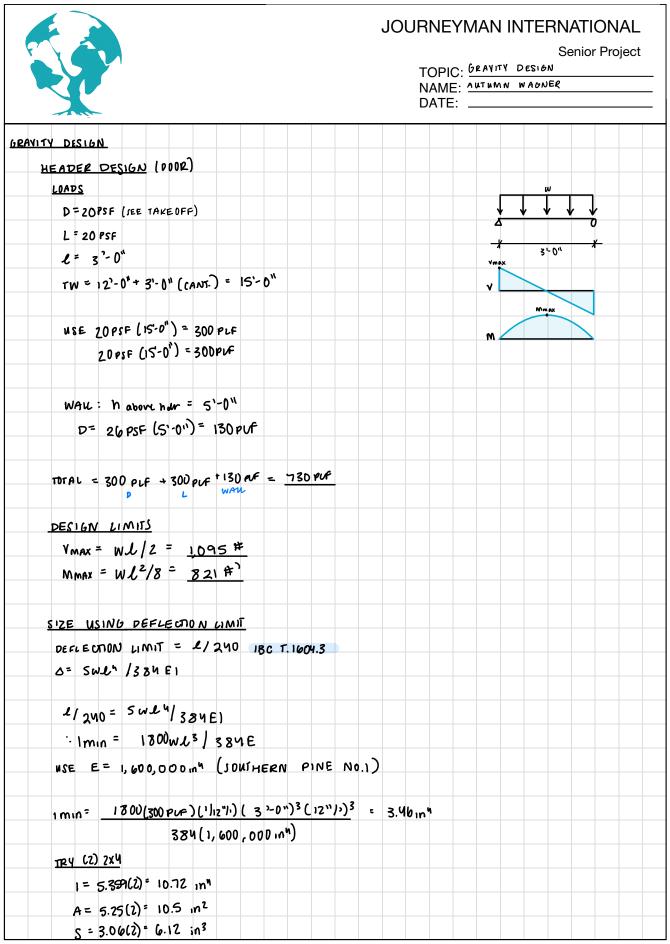
DERMITY DISIEN PEFERENCE VALUES. Col= 1.25 NDS 28.2 Fb = 1, 350 psi NDS TABLE 48 Cl = 1.0 NDS 8.3.3 FY = 115 psi NDS TABLE 48 Cl = 1.0 NDS 8.3.3 FY = 115 psi NDS TABLE 48 Cl = 1.1 (Fb) NDS 4.3.6 E = 1,600.000 psi NDS TABLE 48 Cl = 1.1 (Fb) NDS 4.3.9 Cl = 1,600.000 psi NDS TABLE 48 Cl = 1.1 NDS 4.3.9 Cl = 1,0 NDS 2.3.3 Cm = 1.0 NDS 4.3.9 Cl = 1,0 NDS 4.3.9 Cl = 1.0 NDS 4.3.9 Cl = 1,0 NDS 4.3.9 Check BENDING CHECK SHEAR Check BENDING CHECK SHEAR Fb= M/S fv = 1,5(.575.8)/8.25 in 2 = 1,12.9 NDS 4.1.1 (L) (L) (S) = 1.5(.575.8)/8.25 in 2 = 1,12.9 NDS = 0.5 (.575.8)/8.25 in 2 = 1,12.9 NDS = 1.5(.575.8)/8.25 in 2 = 1,12.9 NDS = 1.5(.575.8)/8.25 in 2 = 1,12.9 ND = 0.8 si Fb'= Fb Co Cm (L (C (C (C F) F4) = FV COCM (C) (C)) = 1.5(.575.8)/8.25 in 2 = 1,350 psi (1.25) = 1.5(.575.8) = 2,135 psi = 2.19 psi dl = 0.9 T (C (C (D N) Decelection (D (D (D P)) Decelection (D (D (D P)) IBC T.1600.5 Augue pto (S): \text{	RAFTER DESIGN (LING) MODIFICATION FACTORS $cd = 1.25$ NDS 23.2 $Cl = 1.0$ NDS 3.3.3 $CF = 1.1$ (Fb) NDS 4.3.6 $Cr = 1.15$ NDS 4.3.9 $Ct = 1.0$ NDS 2.3.3 $Ct = 1.0$ NDS 4.3.9 $Ct = 1.0$ NDS 4.3.9 $Ct = 1.0$ NDS 4.3.9	Fb = 1, Fγ = 1 ⁻ E = 1,	350 psi 15 psi ,600,00	NDS T NDS T O PSI	ABLE	18	415 				
$\begin{array}{c} \text{MODIFICATION FACTORS} \qquad \text{PEF SERVIC VALUES} \\ \text{Color 1.25 NDS 25.2} & \text{Fb} = 1,50 \text{ psi} \text{ NDS TABLE 14B} \\ \text{CI = 1.0 NDS 25.3} & \text{Fv} = 175 \text{ psi} \text{ NDS TABLE 14B} \\ \text{CI = 1.0 NDS 25.3} & \text{Fv} = 175 \text{ psi} \text{ NDS TABLE 14B} \\ \text{CF = 1.1 (FL) NDS 143.6} & \text{E = 1,600,000 psi} \text{ NDS TABLE 14B} \\ \text{CF = 1.15 NDS 143.6} & \text{E = 1,600,000 psi} \text{ NDS TABLE 14B} \\ \text{CF = 1.15 NDS 143.6} & \text{E = 1,600,000 psi} \text{ NDS TABLE 14B} \\ \text{CF = 1.0 NDS 23.3} & \text{Che = 1.0 NDS 1414,5.14} \\ \text{CHECK BENDIN/2} & \text{CHECK SHEAR} \\ \text{Fb} = \text{N/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{N/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = \text{M/S} & \text{fv} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = 1.0 \text{ NDS 1414, 5.14} \\ \text{Fb} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = 1.5 \text{ N/S} \text{ NJS TABLE 14B} \\ \text{Fb} = 1.5 \text{ NJS TABLE 14B} \\ \text{FJ} = 1.5 $	$\frac{MOD_{1}FICATION}{MOD_{1}FICATION} FACTORS$ $Cd = 1.25 NDS 23.2$ $Cl = 1.0 NDS 3.3.3$ $CF = 1.1 (Fb) NDS 4.3.6$ $Cr = 1.15 NDS 4.3.9$ $Ct = 1.0 NDS 2.3.3$ $Cm = 1.0 NDS 4.14, S, 1.4$	Fb = 1, Fγ = 1 ⁻ E = 1,	350 psi 15 psi ,600,00	NDS T NDS T O PSI	ABLE	18	918				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Cd = 1.25 NDS 23.2 Cl = 1.0 NDS 3.3.3 CF = 1.1 (Fb) NDS 4.3.6 Cr = 1.15 NDS 4.3.9 Ct = 1.0 NDS 2.3.3 CM = 1.0 NDS 4.14, 5, 1.4	Fb = 1, Fγ = 1 ⁻ E = 1,	350 psi 15 psi ,600,00	NDS T NDS T O PSI	ABLE	18	4B				
$\begin{array}{c} cd = 1.25 \text{ NDS } 25.2 \qquad Fb = 1,550 \text{ psi} \text{NDS } TRUE 4B \\ cl = 1.0 \text{ NDS } 8.3.3 \qquad Fv = 175 \text{ psi} \text{NDS } TRUE 4B \\ cr = 1.1 (Fb) \text{ NDS } 43.9 \\ cf = 1.0 \text{ NDS } 43.9 \\ cf = 1.0 \text{ NDS } 2.3.3 \\ cm = 1.0 \text{ NDS } 2.3.3 \\ cm = 1.0 \text{ NDS } 414,5,14 \\ \hline \text{CHE(L BENDIN/2} \qquad \text{CHE(L' SHEAR} \\ Fb = M)S \qquad fv = 1.5(BTSH) / 8.25 \text{ in}^2 \\ = 1429 \text{ psi} \qquad fv = 1.5(BTSH) / 8.25 \text{ in}^2 \\ = 1429 \text{ psi} \qquad fv = 1.5(BTSH) / 8.25 \text{ in}^2 \\ = 1350 \text{ psi} (120^3) / 7.56 \text{ in}^3 \qquad fv = 1.5(BTSH) / 8.25 \text{ in}^2 \\ = 1429 \text{ psi} \qquad fv = 0.8 \text{ psi} \\ Fb'' = Fb \text{ Co } Ch (b) (ch (c) (cr Fv') = FV (coch (c) (c) \\ = 1,350 \text{ psi} (125) (1.1) (1.15) \qquad fv = 175 \text{ psi} (1.25) \\ = 2,135 \text{ psi} \qquad fv = 0.8 \text{ psi} \\ dl a = 0, \phi T \therefore o K \checkmark \qquad dl (c = 0.3) \therefore OK \checkmark \\ cuellek \text{ DEELECTION} \\ dsi (estween surgeoers) : & \Delta x (oveelAND) \\ \Delta x (setween surgeoers) : & \Delta x (oveelAND) \\ \Delta x (setween surgeoers) : & \Delta x (oveelAND) \\ \Delta x (ov$	Cd = 1.25 NDS 23.2 Cl = 1.0 NDS 3.3.3 CF = 1.1 (Fb) NDS 4.3.6 Cr = 1.15 NDS 4.3.9 Ct = 1.0 NDS 2.3.3 CM = 1.0 NDS 4.14, 5, 1.4	Fb = 1, Fγ = 1 ⁻ E = 1,	350 psi 15 psi ,600,00	NDS T NDS T O PSI	ABLE	18	418				
$C_{L} = L_{0} \text{ NDS } 8.3.3 \qquad F_{V} = 115 \text{ ps}; \text{ NDS } TABLE 4B$ $C_{F} = 1.1 (F_{b}) \text{ NPS } 43.6 \qquad E_{-} 1,600,000 \text{ ps}; \text{ NDS } TABLE 4B$ $C_{F} = 1.15 \text{ NDS } 43.9$ $C_{E} = 1.0 \text{ NDS } 2.3.3$ $C_{M} = 1.0 \text{ NDS } 4.14, \text{ s}, 14$ $C_{M} = 1.0 \text{ NDS } 4.14, \text{ s}, 14$ $C_{M} = (1.0 \text{ NDS } 4.14, \text{ s}, 14)$ $C_{M} = (1.0 \text{ NDS } 4.14, 14)$ $C_{M} = (1.0 \text{ NDS } 4$	$C_{L} = 1.0$ NDS 3.3.3 $C_{F} = 1.1$ (Fb) NDS 4.3.6 $C_{T} = 1.15$ NDS 4.3.9 $C_{E} = 1.0$ NDS 2.3.3 $C_{M} = 1.0$ NDS 4.14, 5.14	Fy = 1 E = 1,	15 psi ,600,00	NDS T	ABLE	18	<u>чв</u>				
$c_{F} = 1.1 (F_{b}) \text{ MpS } 4.3.6 \qquad E = 1,600.000 \text{ psi} \text{ Nos TABLE 4B}$ $c_{T} = 1.15 \text{ MpS } 4.3.9$ $c_{6} = 1.0 \text{ NpS } 2.3.3$ $c_{M} = 1.0 \text{ NpS } 4.14, \text{ s. 14}$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 14})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 15})$ $c_{H} = (1.0 \text{ NpS } 4.14, \text{ s. 16})$ $c_{H} = (1.0 \text{ NpS } 4$	CF = 1.1 (Fb) NDS 4.3.6 Cr = 1.15 NDS 4.3.9 Ct = 1.0 NDS 2.3.3 Cm = 1.0 NDS 4.14,5,14	E = 1,	. 600, 00	0 ρςι			48				
$Cr = 1.15 \text{ MDS } 43.9$ $C_{4} = 1.0 \text{ MDS } 2.3.3$ $C_{M} = 1.0 \text{ MDS } 4.14, S, 14$ $C_{H} = (L, SheAR, She$	Cr = 1.15 NDS 4.3.9 Ct = 1.0 NDS 2.3.3 Cm = 1.0 NDS 4.14, 5, 1.4										
$\begin{array}{c} C_{M} = 1.0 \text{MDS } 4.14_{1,S,LM} \\ \hline \\ C_{HE}(L, RENDIN(L) \\ F_{D} = M/S \\ F_{D} = F_{D} C_{D} C_{M} (12^{n})) \int 7.56 in^{3} \\ = 1.5(3754) \int 8.25 in^{2} \\ = 0.8 psi \\ F_{D} = F_{D} C_{D} C_{M} (12^{n})) \int 7.56 in^{3} \\ = 1.5(3754) \int 8.25 in^{2} \\ = 0.8 psi \\ F_{D} = F_{D} C_{D} C_{M} (12^{n})) \int 7.56 in^{3} \\ = 1.5(3754) \int 8.25 in^{2} \\ = 0.8 psi \\ F_{D} = F_{D} C_{D} C_{M} (12^{n})) \int 7.56 in^{3} \\ = 1.5(3754) \int 8.25 in^{2} \\ = 0.8 psi \\ F_{D} = F_{D} C_{D} C_{M} (110) (1.15) \\ = 1.558i (1.25) \\ = 2.1356 psi \\ = 2.19 psi \\ 4/c = 0.31 \\ OK \\ \hline \\ CHECK DEFLECTION \\ INIT = 2/240 (nonplastic 0_{L}) BC T.1004.3 \\ \Delta all = 0.9^{m} \\ \Delta x (66 TWEEN SUPPORTS) \\ \Delta x (0.00000000000 \\ A = Wx/24EL (1^{n} \cdot 2Jx^{2} + Jx^{2} - 2a^{2}L^{2} + 3a^{2}x^{2}) \\ W = 27000000000000000 \\ \Delta x (10000000000000000 \\ A = Wx/24EL (1^{n} \cdot 2Jx^{2} + Jx^{2} - 2a^{2}L^{2} + 3a^{2}x^{2}) \\ W = 27000000000000000000 \\ \Delta x (100000000000000000000000000000000000$	Cm = 1.0 NDS 4.14, 5.14		CHECK	CHE A							
$\begin{array}{c} C_{M} = 1.0 \text{ADS } 4.14_{1,S,LM} \\ \hline \\ C_{M} = C_{L} \text{RENDIN}(2 CHECK_{SHEAR} \\ F_{D} = M/S f_{V} > 1.5 \vee /A \\ = 900 \text{B}^{3}(12^{n})) \int 7.56 \text{in}^{3} = 1.5(375 \text{H}) \int 8.25 \text{in}^{2} \\ = 1.929 \text{psi} \\ F_{D} = F_{D} C_{0} \text{Cm}(4 \text{CL} C_{M}, C_{L} Cr F_{V}) = F_{V} \text{Cocm}(T C_{L}) \\ = 1.350 \text{psi} (1.25) (1.1) (1.15) \\ = 1.75 \text{psi} (1.25) \\ = 2.1355 \text{psi} \\ A/c = 0.51 O \times \checkmark A/c = 0.31 O \times \checkmark \\ \hline \\ CHECK_{D} EFLECTION \\ DECLECTION \ LIMIT = 2/240 \ (nonplasher \Delta_{L}) 1BC \ T.1004.3 \\ \hline \\ CMECK_{D} EFLECTION \\ \Delta = 40.24 \text{E}^{3} \text{C}^{3} \text{C}^{3} \text{C}^{3} \text{C}^{2} \text{C}^{3} \text$	Cm = 1.0 NDS 4.14, 5.14		CHECK	CHE A							
$\begin{array}{c} (HE(L, BENDIND) & (HE(L, BENDIND) \\ Fb = M)S & fv > 1.5v/A \\ & = 900 s^{1}(12^{n})^{1}) \int 7.56 in^{3} & = 1.5(B354) \int 8.25 in^{2} \\ & = 1429 psi & = 08 esi \\ Fb' = Fb Co Cm Cl (L Cm Cl Cr Fv' = Fv Cocm Cl Ci \\ & = 1,350 psi (1.25) \\ & = 2,135 psi & = 219 psi \\ d c = 0.67 & OK & d c = 0.31 & OK & O$			CHECK	SHE A							
$Fb = M/S$ $fv = 1.5v/A$ $= 900 \#^{2}(12^{n}h) / 7.56 in^{3}$ $= 1.5(E_{3}TSH) / 8.2S in^{2}$ $= 1429 Psi$ $= 0.8 Psi$ $Fb' = Fb Co Cm Ch (L Cm (i Cr) Fv' = Fv (cocm Ch (ci) = 1,350 Psi (125) (1.0) U(15) = 17S Psi (1.2S) = 2,1355 Psi = 219 Psi dlc = 0.67 ok dlc = 0.67 ok dlc = 0.67 ok dlc = 0.70^{n} dlc = 0.7^{n} dx (setwen supports): \Delta x (oveen ANO): \Delta x (setwen supports): \Delta x (oveen ANO): \Delta = wx/2u = U(1^{n}c) = 2t^{2}x^{2} + 2a^{2}x^{2} \Delta = wx/2u = U(1^{n}c) = 12^{n} + 12^{n} = 20.3 in^{n} w = 27 Pue(1/12) E = 1.0 \times 10^{10}psi w = 27 Pue(1/12) E = 1.0 \times 10^{10}psi x = (y'(173) = 71^{n}) 1 = 20.3 in^{n} x = (y'(173) = 71^{n}) 1 = 20.3 in^{n} L = 12 \cdot (1n^{n}h) = 10^{m} a = (y'(171) = 77^{n}) L = 12 \cdot (10^{n}h) = 10^{m} a = (y'(171) = 71^{n}) $	CHECK BENDINO		CHECK	SHE A							
$f_{b} = M/S$ $f_{v} \ge 1.5v/A$ $= 900 \#^{2}(12^{n}h) \int 7.56 in^{3}$ $= 1.5(1535 \#) \int 8.25 in^{2}$ $= 1.929 Psi$ $= 0.8 Psi$ $Fb' = Fb Co Cm C_{4} CL Cm Ci Cr$ $Fv' \ge Fv CoCm C_{4} Ci$ $= 1.350 Psi$ $= 0.8 Psi$ $= 1.350 Psi$ $= 1.5(135 \#) / 8.25 in^{2}$ $= 1.929 Psi$ $= 0.8 Psi$ $= 1.350 Psi$ $= 1.5(125)$ $= 2.1355 Psi$ $= 2.19 Psi$ $d_{10} = 0.61$ $c_{10} C V$ $d_{10} = 0.61$ $c_{10} V$ $d_{10} = 0.61$ $d_{10} V$ $d_{10} = 0.61$ $d_{10} V$				DIF	R						
= 900 $\#^{1}(12^{N})$ / 7.56 in ³ = 1.5($\#$ 35 $\#$) / 8.25 in ² = 1429 ps; = 08 ps; Fb'= Fb Co CM C4 (L CFL (i Cr FV) = FV Co CM C4 (i = 1,350 ps; (125) (1.0) (1.15) = 175 ps; (1.25) = 2,135 ps; = 219 ps; d c = 0.67 ·· 0K V d/c = 0.31 ·· 0K V (LHEIK DEFLIC CTION DEFLE COTION LIMIT = $\#/240$ (nonplaster 4L) 18C T. 1604.3 $\Delta all = 0.9^{N}$ Δx (66 TWEEN SUPPORTS): Δx (over μ AND): $\Delta = Wx/24 Ell (1^{N} - 21^{2}x^{2} + 1x^{2} - 2a^{2}L^{2} + 2a^{2}x^{2})$ $\Delta = Wx / 24 El (10^{2}L - L^{2} + 6a^{2}x, -4ax, 2 + 2x^{2})$ $W = 27 pur (1/12)$ $E = 1.6 \times 10^{4}$ ps; $x = (y'(170) = 71^{N}$ $1 = 20.3 m^{N}$ $L = 12 \cdot (10^{N}h) = 10M^{N}$ $a = (y'(171)) = 77^{2}$ $L = 12 \cdot (10^{N}h) = 10M^{N}$ $a = (y'(171)) = 77^{2}$ $\therefore \Delta = 0.15^{N} < 0.9^{N}$ $\therefore 0K $			fv ≥ 1								
$= [429 \text{ psi} = 68 \text{ psi}$ $Fb' = Fb Co Cm C+ (L C_{h} C; Cr Fv' = Fv CoCm Cr C;$ $= 1,350 \text{ psi} (1.25) (1.1) (1.15) = 175 \text{ psi} (1.25)$ $= 2,135 \text{ psi} = 2.19 \text{ psi}$ $4 c = 0.67 + 0 \times \sqrt{4/c} = 0.31 + 0 \times \sqrt{4/c}$ $(HEOK DEFLECTION$ $DEFLECTION LIMIT = 1/240 (nonplaster dL) IBC T.1604.3$ $\therefore \Delta all = 0.7^{11}$ $\Delta x (GETWEEN SUPPORTS): \Delta x (Over HANO)$ $\Delta = Wx/24 \text{ Ell } (H^{2} - 2I^{2}x^{2} + Ix^{5} - 2a^{2}L^{2} + 2a^{2}x^{2}) \Delta = Wx/24 \text{ El } (4a^{2}L - L^{3} + Ga^{2}x, -4ax, 2 + 2a^{2}x^{2})$ $W = 27 \text{ pure } ('/12) E = 1.6 \times 10^{4} \text{ psi}$ $U = 27 \text{ pure } ('/12) E = 1.6 \times 10^{4} \text{ psi}$ $U = 27 \text{ pure } ('/12) E = 1.6 \times 10^{4} \text{ psi}$ $U = 27 \text{ pure } ('/12) E = 1.6 \times 10^{4} \text{ psi}$ $U = 27 \text{ pure } ('/12) = 72^{11} 1 = 20.8 \text{ in}^{11} \times U(170) = 712^{11} 1 = 20.8 \text{ in}^{11} \text{ ar } U(170) = 712^{11} \text{ ar } U(17$:		1		8.25	in ^z				
Fb'= Fb Co Cm C+ (L Cm C; Cr Fv'= Fv Co Cm Ct C; = 1,350 ps; (125) (1.1) (1.15) = 175 ps; (1.25) = 2,135 ps; = 219 ps; dlc= 0. 61 \therefore 0 K V dlc = 0.31 \therefore 0 K V cueen define on the fill of the fill						0					
$= 1,350 \text{ psi} (1.25) (1.1) (1.15) = 175 \text{ psi} (1.25)$ $= 2,1355 \text{ psi} = 219 \text{ psi}$ $d _{c} = 0.67 \therefore 0 \times \sqrt{4/c} = 0.31 \therefore 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \therefore 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \therefore 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \therefore 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \therefore 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \therefore 0 \times \sqrt{4/c} = 0.31 \times 0 \times \sqrt{4/c}$ $(d _{c} = 0.31 \times 0 \times \sqrt{4/c} = 0.31 \times 0.41 \times $		•		-		r (.;					
$= 2,135 \text{ psi} = 219 \text{ psi}$ $= 2,135 \text{ psi} = 219 \text{ psi}$ $= 2,135 \text{ psi} = 4/2 \text{ psi}$ $= 0.67 \therefore 0.8 \text{ psi} = 4/240 \text{ (nonpraster Δ_L)} \text{ rsc T.1604.3}$ $= 0.9^{11} \text{ sc T.1604.3}$ $\therefore \Delta all = 0.9^{11} \text{ sc T.1604.3}$ $\Delta x \text{ (over HANO)}$ $\Delta x \text{ (eetween supports)} = \Delta x \text{ (over HANO)}$ $\Delta = 40.724 \text{ ell } (1^{41} \cdot 2^{2}x^{2} + 1x^{5} - 2a^{2}L^{2} + 2a^{2}x^{2}) \Delta = 40.724 \text{ ell } (14a^{2}L - L^{5} + 6a^{2}x) - 4ax^{2} + 2x^{2}$ $= 27 \text{ out } (1/12) E = 1.6 \times 10^{4} \text{ psi}$ $= 27 \text{ out } (1/12) E = 1.6 \times 10^{4} \text{ psi}$ $X = (0.15^{11} - 12^{11}) 1 = 20.8 \text{ n}^{11} \text{ sc } (12^{11}) = 72^{11} sc$											
$\begin{aligned} d c = 0, & \forall T \\ & & \forall V \\ \hline \\ (HEIK DEFIECTION) \\ DEFLECTION LIMIT = L/240 (nonplaster \Delta_L) IBC T. 1604.3 \\ & \therefore \Delta all = 0.9^{n} \\ \Delta x (BETWEEN SUPPORTS): \\ \Delta x (OVERWANO): \\ \Delta = WX/24EL (L^{n} - 2L^{2}X^{2} + Lx^{5} - 2a^{2}L^{2} + 2a^{2}X^{2}) \\ W = 2TPUF (L'/12) \\ E = 1.6 \times 10^{6} psi \\ X = (\psi'(12)) = TL^{n} \\ L = 12 \cdot (12^{n}h) = 14M^{n} \\ a = (\psi'(12^{n}h)) = TZ^{n} \\ \therefore \Delta = 0.15^{n} < 0.9^{n} \\ \therefore OK \\ V \\ \hline \\ \end{bmatrix} $					-						
$\begin{array}{c} (\text{HECK} \text{DEFLECTION} \\ \text{DEFLECTION} \text{LIMIT} = 1/240 (\text{nonplaster} \Delta_L) \text{IBC T. 1604.3} \\ \hline \\ \therefore \Delta all = 0.9^{\text{H}} \\ \Delta x (\text{BETWEEN SUPPORTS}): \\ \Delta = \text{Wx}/24\text{Ell} \left(l^{4} \cdot 2l^{2x^{2}} + lx^{5} - 2a^{2}l^{2} + 2a^{2}x^{2} \right) \Delta = \text{Wx}/24\text{El} \left(4a^{2}l - l^{5} + 6a^{2}x_{1} - 4ax_{1}^{2} + x^{3} \\ \text{W} = 27 \text{PUF} \left(l/12 \right) \text{E} = 1.6 \times 10^{4} \text{psi} \\ x = (0^{1}(12)) = 71^{\text{H}} 1 = 20.8 \text{ in}^{\text{H}} \\ L = 12^{1}(12^{11}) = 71^{\text{H}} 1 = 20.8 \text{ in}^{\text{H}} \\ L = 12^{1}(12^{11}) = 104^{\text{H}} a = (0^{1}(12^{11})) = 72^{\text{H}} \\ \therefore \Delta = 0.15^{\text{H}} < 0.9^{\text{H}} OK \sqrt{ \qquad \therefore \Delta = 0.75^{\text{H}} < 0.9^{\text{H}} \left(2l = 1.8^{\text{H}} \cdots \text{OK} \right) \\ \end{array}$							√				
$DEFLECTION LIMIT = 2/240 (nonplaster \Delta_L) IBC T. 1604.3$ $\therefore \Delta all = 0.9^{11}$ $\Delta x (BETWEEN SUPPORTS): \Delta x (OVERHANO):$ $\Delta = Wx/24EL (L^{N} - 2l^{2}x^{2} + Lx^{5} - 2a^{2}L^{2} + 2a^{2}x^{2}) \Delta = Wx/24EI (4a^{2}L - L^{5} + 6a^{2}x) - 4ax^{2} + x^{2}$ $W = 27 PUF ('/12) E = 1.0 \times 10^{4} Psi; W = 27 PUF ('/12) E = 1.0 \times 10^{4} Psi;$ $x = Q(170) = 71^{11} I = 20.8 in^{11} X = Q(170) = 71^{11} I = 20.8 in^{11}$ $L = 12 \cdot (12^{11}L) = 1444^{11} a = Q(170^{11}L) = 72^{11} L = 12 \cdot (12^{11}L) = 1444^{11} a = Q(170^{11}L) = 72^{11}$ $\therefore \Delta = 0.15^{11} < 0.9^{11} \therefore 0K $ $\therefore \Delta = 0.75^{11} < 0.9^{11} (2) = 1.8^{11} \therefore 0K $											
$DEFLECTION LIMIT = 2/240 (nonplaster \Delta_L) IBC T. 1604.3$ $\therefore \Delta all = 0.9^{11}$ $\Delta x (BETWEEN SUPPORTS): \Delta x (OVERHANO):$ $\Delta = Wx/24EL (L^{N} - 2l^{2}x^{2} + Lx^{5} - 2a^{2}L^{2} + 2a^{2}x^{2}) \Delta = Wx/24EI (4a^{2}L - L^{5} + 6a^{2}x) - 4ax^{2} + x^{2}$ $W = 27 PUF ('/12) E = 1.0 \times 10^{4} Psi; W = 27 PUF ('/12) E = 1.0 \times 10^{4} Psi;$ $x = Q(170) = 71^{11} I = 20.8 in^{11} X = Q(170) = 71^{11} I = 20.8 in^{11}$ $L = 12 \cdot (12^{11}L) = 1444^{11} a = Q(170^{11}L) = 72^{11} L = 12 \cdot (12^{11}L) = 1444^{11} a = Q(170^{11}L) = 72^{11}$ $\therefore \Delta = 0.15^{11} < 0.9^{11} \therefore 0K $ $\therefore \Delta = 0.75^{11} < 0.9^{11} (2) = 1.8^{11} \therefore 0K $	CHEIK DEELE CTION										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		nnoinster	4.)	BC T.16	<i>о</i> н.3						
$\Delta x (BETWEEN SUPPORTS): \Delta x (OVER HANU):$ $\Delta = Wx/24 El (l^{4} \cdot 2l^{2}x^{2} + lx^{5} - 2a^{2}l^{2} + 2a^{2}x^{2}) \Delta = Wx/24El (4a^{2}l - l^{5} + Ga^{2}x) - 4ax^{2} + 2a^{2}x^{2})$ $W = 27 p_{0} E (1/12) E = 1.6 \times 10^{4} p_{5}i$ $W = 27 p_{0} E (1/12) E = 1.6 \times 10^{4} p_{5}i$ $X = (p^{2}(12)) = 72^{11} I = 20.8 in^{11}$ $L = 12 \cdot (12^{11}) = 1444^{11} a = (p^{2}(12^{11})) = 72^{11} I = 20.8 in^{11}$ $L = 12 \cdot (12^{11}) = 1444^{11} a = (p^{2}(12^{11})) = 72^{11} I = 20.8 in^{11} a = (p^{2}(12^{11})) = 72^{11} I = 20.8 in^{11}$ $L = 12 \cdot (12^{11}) = 1444^{11} a = (p^{2}(12^{11})) = 72^{11} I = 20.8 in^{11} a = (p^{2}(12^{11})) = 10^{11} a = (p^{2}(12^{11})) = (p^{2}(12^{11})) = (p^{2}(12^{11})) = (p^{2}(12^{11})) = (p^{2}$		101111-1010-10									
$\Delta = WX/24 ElL (L^{4} - 2L^{2}X^{2} + LX^{3} - 2a^{2}L^{2} + 2a^{2}X^{2}) \qquad \Delta = WX/24 El (4a^{2}L - L^{3} + Ga^{2}X, -4aX, 2 + X)$ $W = 27 \text{ or } (1/12) \qquad E = 1.6 \times 10^{4} \text{ psi} \qquad W = 27 \text{ or } (1/12) \qquad E = 1.6 \times 10^{4} \text{ psi} $ $X = (a^{1}(12)) = 72^{11} \qquad 1 = 20.8 \text{ in}^{11} \qquad X = (a^{1}(12)) = 72^{11} \qquad 1 = 20.8 \text{ in}^{11} $ $L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 72^{11} \qquad L = 12 \cdot (12^{11}L) = 1444^{11} \qquad a = (a^{1}(12^{11}L)) = 172^{11} \qquad L = 12 \cdot (12^{11}L) = 144^{11} \qquad a = (a^{1}(12^{11}L)) = 1$				Δx (NER.	UANO	ŀ .				
$W = 27 \rho_{UF} (1/12) = 1.0 \times 10^{4} \rho_{Si} \qquad W = 27 \rho_{UF} (1/12) = 1.0 \times 10^{4} \rho_{Si} \\ X = (\rho'(127) = 72" \qquad 1 = 20.8 in^{4} \qquad X = (\rho'(127) = 72" \qquad 1 = 20.8 in^{4} \\ L = 12 \cdot (12"/1) = 1444" \qquad a = (\rho'(12"/1) = 72" \qquad L = 12 \cdot (12"/1) = 144" \qquad a = (\rho'(12"/1) = 72 \\ \therefore \Delta = 0.15" < 0.9" \therefore 0 \times \sqrt{ \qquad \therefore \Delta = 0.75" < 0.9"} (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \therefore 0 \times 10^{4} \\ 1 = 12 \cdot (12"/1) = 144 \qquad A = 0.75" < 0.9" (2) = 1.8" \qquad A = 0.75" < 0.9" (2) = 1.8" \qquad A = 0.75" \qquad A = 0.75" < 0.9" (2) = 1.8" \qquad A = 0.75" \qquad$		$-2a^{2}l^{2} + 2$	$2a^2x^2$					21-1ª	⁸ + 60 ²	2x, -4ax,	2 +X13
$X = (y'(17)) = 72''$ $I = 20.8 in^{4}$ $X = (y'(17)) = 72''$ $I = 20.8 in^{4}$ $L = 12 \cdot (17'') = 174''$ $A = (y'(17')) = 77''$ $L = 12 \cdot (17'') = 144'''$ $A = (y'(17')) = 77''$ $ \Delta = 0.15'' < 0.9'''$ $ OK $ $ \Delta = 0.75'' < 0.9'''(2) = 1.8'''$ $ OK $ $ \Delta = 0.15'' < 0.9'''$ $ OK $ $ \Delta = 0.75'' < 0.9'''(2) = 1.8'''$ $ OK $											
∴ 4= 0.15" < 0.9" ∴ 0K √ ∴ 4= 0.75" < 0.9"(2)=1.8" ∴ 0K 1 (ANTILEVER					Хz	6/17	יי ביי א = רוי)")		20.7.0%	
∴ 4= 0.15" < 0.9" ∴ 0K √ ∴ 4= 0.75" < 0.9"(2)=1.8" ∴ 0K 1 (ANTILEVER	1 = 17 · (12"/.) = 144 " A=	6 (171)	= 72		1 =	עיט ש וזינו	2"/.)=	199	a=	6. (12.1.)	=72
				. ,	. =	0 75 ¹¹	< 0	9"1	2) = I,	8° .: e	∍⊬√
					•			Ĩ	CANTIL	EVER	
use z×6 @ 16" oc											
	uce 2×10 (@ 16" 0	<u>.</u>								
					-						



	JOURNEYMAN INTERNATIONAL Senior Projec TOPIC: <u>GRAYITY DESIGN</u> NAME: <u>AUTUMNN WAGNER</u> DATE:	
AVITY DESIGN		
LOFI FRAMING		
MODIFICATION FACTORS		
Col= 1.0 NDS 23.2		
CL = 1.0 NDS 3.3.3		
CF = 1.1 (Fb) NDS 4.3.6		
Cr = 1.15 NDS 43.9		
Ct = 1.0 NDS 2.3.3		
CM = 1.0 NDS 4.14, 5, 14		
REFERENCE VALUES		
Fb= 1,350 psi NDS TABLE 4B		
FY = 175 psi NDS TABLE UB		
CHECK BENDING		
fb= M/S		
= 954 #>(12"))) 7.56 in3		
= 1,514 psi		
Fb'= Fb Co CM Ct CL CFn Ci Cr		
= 1350 psi (1.0) (1.1) (1.15)		
= 1708psi		
alc= 0.89 · ox 1		
CHECK SHEAR		
fv = 1.5v/A		
$= 1.5(318 *) / 8.25 m^2$		
= 57.8 psi		
$Fv^{2} = FV COCM CT C;$		
= 175psi (1.0)		
= IJS PRI		
4/c = 0. 33 - OK 1		
USE 2×6 @ 16" OC		

EAVITY DESIGN LOFT BEAM LOADS D= 13 PSF (SEE TAKE OFF) L= 30PSF		
D = 13 PSF (see take off)		
D= 13 PSF (see take OFF)		
L = 30PSF	× 3'-0" ×	
	4 3'-0"	
$l = 12^{2} - 0^{\circ}$	Vmax	
TW = G' - O''	v	
	Minist	
USE 13PSF (0'-0") = 78 PLF		
3005F (0'-0') = 180 PVF	M	
$TOTAL = 78 PLF + 180 PLF = \frac{258 PLF}{L}$		
DESIGN LIMITS		
Vmax = WL/2 = <u>1548 #</u>		
$M_{MAX} = W \mathcal{L}^2 / 8 = \underline{Y} (U U U H^2)$		
SIZE USING DEFLECTION LIMIT		
DEFLECTION LIMIT = 2/240 1BC T. 1604.3		
$\Delta = SWL^n / 3BHEI$		
2/240 = 5WL4/384E)		
$.1min = 1800 W L^3 / 384E$		
)	
USE E= 1,600,000 m4 (JOUTHERN PINE NO.)		
$1 \min^{2} \frac{1800(180pur)(1127)(12^{-0})^{3}(12^{1}))^{3}}{12}$	5 13) IN 1	
384(1,600,000 m ⁴)		
TRY (2) 2X8		
1 = 47.03(2) + 95.20 mm		
A= 10.88(2) = 2176,n2		
S = 13.14 (2) = 20.28in3		

		TOPIC: NAME:	GRAYITY DESIG	
GRAVITY DESIGN				
LOF1 BEAM				
MODIFICATION FACTORS				
Col= 1. 0 NDS 23.2				
CL = 1.0 NDS 3.3.3				
CF = 1.1 (Fb) NDS 4.3.6				
Cr = 1.0 NDS 43.9				
CE= 1.0 NDS 2.3.3				
CM = 1.0 NDS 4.14, 5. 14				
REFERENCE VALUES				
Fo= 1,250 psi NDS TABLE 4B				
Fr = 175 ps; NDS TABLE 4B				
CHECK BENDING				
fb= M/S				
= 4644# (12"/>) / 13.14(2)				
= 2121 psi				
Fb'= Fb Co CM Ct CL CFn Ci Cr				
= 1250 psi (1.0) (1.1) (1.0) (
= 2750 psi				
dlc= 0, → → → →				
CHECK SHEAR				
fv = 1.5 V / A				
= $1.5(1543 \pm) / 10.88 \ln^2 (2)$				
= 107 psi				
Fr)= FY COCM LT (;				
= 17505i (1.0)(2)				
= 350 psi				
a/c = 0.3 0K V				
USE DOUBLE 2×8 SIS	RED W] 1/2 PI	NWOOD SHIM		



	JOURNEYMAN INTERNATIONAL Senior Project TOPIC: <u>GRAYITY DESIGN</u> NAME: <u>AUTHMN WACNER</u> DATE:
GRAVITY DESIGN	
HEADER DESIGN (DOIR)	
MODIFICATION FACTORS	
$c_{al} = 1.0$ NDS 23.2	
$C_{L} = 1.0$ NDS 3.3.3	
CF = 1.1 (Fb) NDS 4.3.6	
Cr = 1.0 NDS 43.9	
Ct = 1.0 NDS 2.3.3	
Cm = 1.0 NDS 4.44, 5.1.4	
REFERENCE VALUES	
Fb= 1,050 psi NDS TABLE 4B Fy= 175 psi NDS TABLE 4B	
CHECK BENDING	
$f_b = M/S$	
= 821 #'(12")) / 6.12 in3	
= 1je10 psi	
Fb'= Fb Co CM Cd CL CA Ci Cr	
= $(150 psi(1.0)(1.0)(1.1))$	
= 1,815 psi	
alc= 0.89:0K V	
CHECK SHEAR	
fv? 1.5v/A	
= 1.5(1995#)/ 10.5 in ²	
= 156 psi	
Fv = FV COCM GT C;	
= 1750si (1.0)	
= INS PSi	
4/c = 0.86 OK 1	
USE DOUBLE 2×4 W) 1	MIH2 0000 SHIM

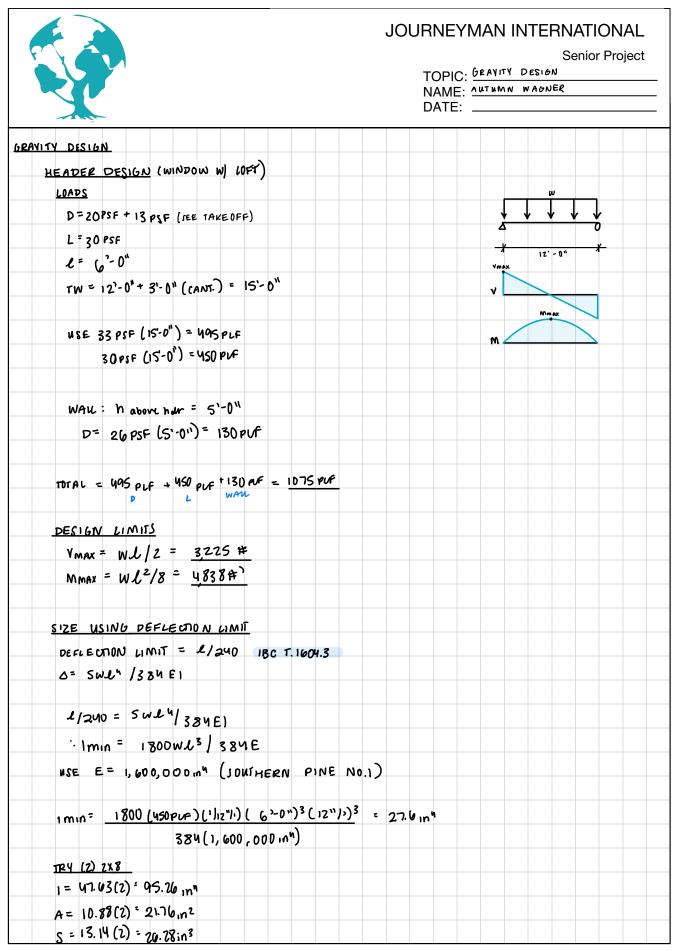
J	OURNEYMAN INTERNATIONAL Senior Project TOPIC: <u>GRAYITY DESIGN</u> NAME: <u>AUTHMN WADNER</u> DATE:
GRAVITY DESIGN	
HEADER DESIGN (WINDOW W/O WET WORST CASE)	
LUADS	
D=20PSF (SEE TAKE OFF)	
L = 20 PSF	
l = 6 ² -0"	1 12°-0" 1 Vmex
TW = 12'-0" + 3'-0" (CANT.) = 15'-0"	v
	10 m ax
use 20 psf (15-0") = 300 plf	M
20psf(15-0) = 300pvf	
WALL: h above now = 5'-0"	
D= 26 PSF (5'-0")= 130 PUF	
TOTAL = 300 PLF + 300 PLF + 130 PLF = 730 PLF P L $WALL$	
DESIGN LIMITS	
$V_{MAX} = WL/2 = 2190 \#$	
$M_{MAX} = W L^2 / 8 = 3285 f^2$	
SIZE USING DEFLECTION UMIT	
DEFLECTION LIMIT = 2/240 18C T. 1604.3	
$\Delta = S \omega L^{h} / 3 B M E I$	
$2/240 = 5 \omega L^{4}/384E$	
$.1min = 1800 W L^3 / 384E$	
NSE E = 1,600,000 m (JOUTHERN PINE NO.1)	
$1 \min = \frac{1,800}{(300 \text{ pur})} (1/12^{-1/1}) (6^{2} - 0^{-1})^{3} (12^{-1}/1)^{3} = 2$	(7.6 in 4
384(1,600,000 mm)	
TRY (2) 2×8	
$1 = 47.43(2)^{2} 95.26 m^{4}$	
$A = 10.88(2) + 21.76 m^2$	
$S = 13.14(2) = 20.28 \text{ in}^3$	



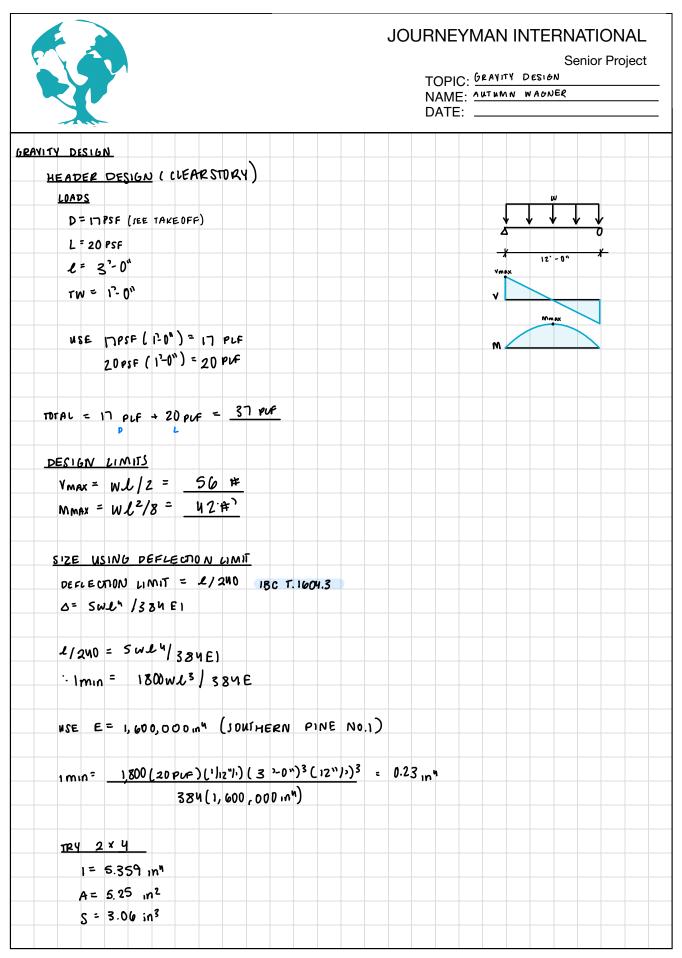
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Senior Project

	TOPIC: GRAVITY DESIGN
	NAME: ANTHINN WAONER
	DATE:
AVITY DESIGN	
HEADER DESIGN (WINDOW W)O WET WORST CASE)	
MODIFICATION FACTORS	
Col= 1. 0 NDS 23.2	
CL = 1.0 NDS 3.3.3	
CF = 1.1 (Fb) NDS 4.3.6	
Cr = 1.0 NDS 43.9	
C = 1.0 NDS 2.3.3	
CM = 1.0 NDS 4.14, 5.14	
- 11 1. 0 11 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
REFERENCE VALUES	
Fb= 1,250psi NDS TABLE UB	
FY= 175 psi NDS TABLE 4B	
CHECK BENDING	
fb= M/S	
= $3285 \#^{(12^{n})} / 13.14(2) m^{3}$	
= 1500 psi	
Fb'= Fb Co CM Cz CL CFL Ci Cr	
= 1250 psi (10) (1.1) (1.0) (2)	
DOURGUE DOUNGUE	
= 2750 psi	
d c= 0.55∴ 0K √	
CHECK SHEAR	
fv = 1.5 v / A	
= $1.5(2190 \pm) / 10.88 \ln^2 (2)$	
= 151 psi	
$Fv^{2} = FV COCM CT Ci$	
= 175psi (1.0)(2)	
boulie	
= 350 psi	
alc = 0.43 ok √	
USE DOUBLE 2×8 SISTERED W) 1	5 MAMONA PHIMA



	JOURNEYMAN INTERNATIONAL Senior Project TOPIC: <u>GRAYITY DESIGN</u> NAME: <u>AUTIMAN WADNER</u> DATE:
PRAVITY DESIGN	
HEADER DESIGN (WINDOW W) LOFT)	
MODIFICATION FACTORS	
Col= 1. 0 NDS 23.2	
$C_{L} = 1.0$ NDS 3.3.3	
CF = 1.1 (Fb) NDS 4.3.6	
Cr = 1.0 NDS 43.9	
Ct = 1.0 NDS 2.3.3	
CM = 1.0 NDS 414,5.14	
REFERENCE VALUES	
Fb= 1,250psi NDS TABLE 4B	
FY = 175 psi NDS TABLE 4B	
CHECK BENDING	
fb= M/S	
= $4838 \pm (12\%)$ / 13.14(2) in ³	
= 2209 psi	
Fb'= Fb Co CM Ct CL CM Ci Cr	
= 1250 psi (1.0) (1.1) (1.0) (2)	
= 2750 psi	
d]c= 0.8 ∴ 0K √	
CHECK SHEAR	
fv > 1.5 v / A	
$= 1.5(3225*) / 10.88 \text{ in } ^2 (7)$	
= 222 psi	
$Fv^2 = Fv Cocm GC;$	
= 17505i (1.0)(2)	
= 350 PSi boubure	
alc = 0.64 - 0K 1	
USE DOUBLE 2×8 SISTERED W	12 PUR WOOD SHIM





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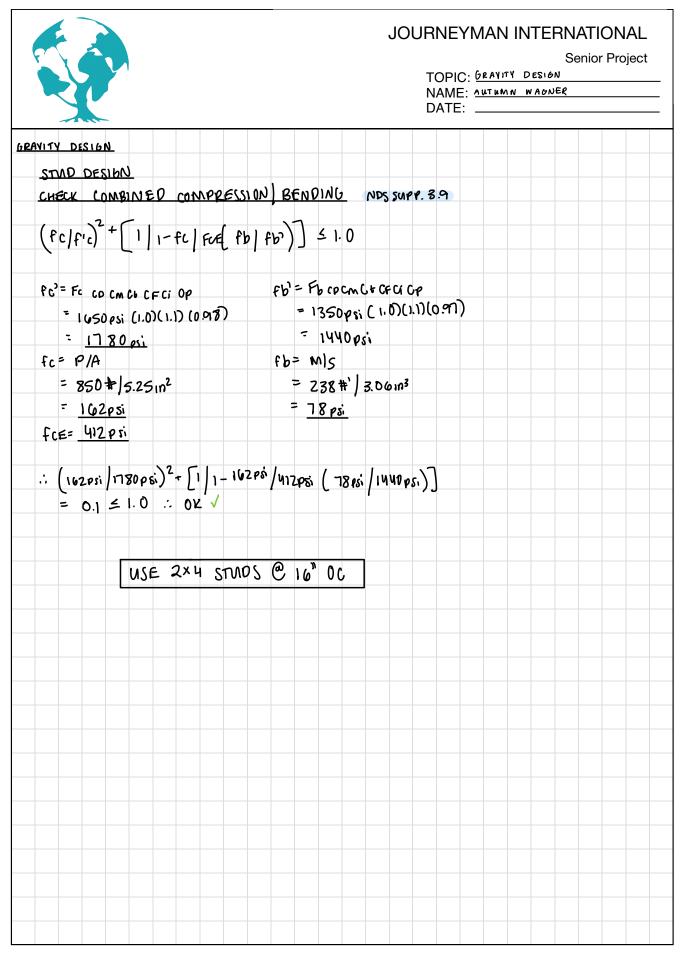
Senior Project

			TOPIC:			
			NAME:			
			DATE:			
AVITY DESIGN						
HEADER DESIGN (WINDO	w w)o loft woesi	CASE)				
MODIFICATION FACTOR	S					
col= 1.25 NDS 23.2						
CL = 1.0 NDS 3.3.3						
CF = 1.1 (Fb) NDS						
Cr = 1.0 NDS 4.3.9						
Ct = 1.0 NDS 2.3.	3					
CM = 1.0 NDS 4.14	, 5. 1.4					
REFERENCE VALUES						
Fb= 1,500psi NDS 1						
Fr = 175 psi NDS 1	TABLE UB					
CHECK BENDINU						
fb= M/S						
= 42#>(12"/>)	$1 3.06 \text{ m}^3$					
= 105 psi						
Fb'= Fb Co Cm C+ C						
= 1500psi (1.0)	(1.1) (1.25)					
= 2011 3 psi						
alc= 0.1 0x	< ✓					
CHECK SHEAR						
fv = 1.5v / A						
= 1.5(56 #)/5.	26 12					
= 16 psi						
Fv'= FV COCM CT C						
= 175psi (1.0)					
= 175 psi						
4/c = 0.1 ∴ (0 K 🗸					
	USE 2×4 HI	DRS ARONE	CA. EAR SMRY	WIND	OWS	
	MJL A^1 11	LO VIOUVE		VV ((VII)		

EXPOSURE: C ASCET-16 \$267 BASIC SPEED = 112 MPH ASCET-16 F. 265-16 $K_{ZT} = 1.0 (FLAT) ASCET16 $20.8-1 CLASS I BLD6 (SIMAPLE DIAPHRAGA, N \pm 60^{2}, 0.2 \leq 1/6 \leq 5.0) ASCET-16 $27.4.2H = 122 - 0N1/B RATIO = 30^{2}/24^{2} = 1.25 SAY 1.0 ASCET-16 $275.1WALL PRESSURE @ 115 MPH ASCET-16 T.27.5-1$		TOPIC: NAME:			MAN INTERNATIONAL Senior Project <u>wind loading</u> <u>autumn wacner</u>			
ASCE 7-16 Ch.21 b SIMPURED DRECTIONAL METHOD LETTERIA RISK: 11 ASCE7-16 T. 1.5-1 EXPOSURE: C ASCE7-16 \$267 BASIC SPEED = 112 MPH ARCE716 F.20.5-16 $K_{2T} = 1.0$ (FLAT) ASCE716 \$26.8-1 CLASS I BLD6 (SIMPUE DIAP MERGIN, h160°, b25 $V/b \le 5.0$) ASCE716 \$27.51 $K_{2T} = 1.0$ (FLAT) ASCE716 \$20.5-1 $K_{2T} = 1.0$ (FLAT) A	LATERAL FORCES							
ASCE 7-16 Ch.27 b simplified DirectionNAL METHOD LETITERIA RISK: II ASCE7-16 T. 1.5-1 EXPOSURE: C ASCE7-16 \$2637 BASIC SPEED = 112 MPH ASCE7-16 \$26376 KZT = 1.0 (FLAT) ASCE7-16 \$26371 CLASS I BLD6 (sinnove DIAP MEADA, hib0', 625 $4/6 \pm 5.0$) ASCE7-16 \$2751 UDADING PLAGRAM H: 12'-0 ⁴ LIS RATIO = $30^{2}/24^{2}$ = 1.75 SAY 1.0 ASCE7-16 \$2751 WALL PRESSURE C IIS MPH ASCE7-16 T.275-1 * USING h= 15ft W TABUE PD = 25.2 RSF PO = 25.2 RSF PO = 25.2 RSF PO = 25.2 RSF PD = 25.2 (112/115) ² = 24PSF NIN PRESSURE = 16 PSF ASCE7-16 # 27.15 BASE SHEAK PAVE = 24 PSF AWALL FIN PAVE = 20 (10') = 300 Cft ² AWALL FIN PAVE = 20 (10') = 200 Cft ² AWALL FIN PAVE = 300 Cft ² (24 PSF) =]200 Pft PAVE = 300 Cft ² (24 PSF) =]200 Pft	WIND ANAWSIS				,	Ph = 2	4 psf	
$\begin{array}{c} \underline{(2,1)} \overline{(2,1)} (2,$	ASCE 7-16 Ch.27							
RISK: 11 ASCE7-16 T. 1.5-1 EXPOSURE: C ASCE7-16 \$267 BASIC SPEED = 112 MPH ASCE7-16 \$205-16 KZT = 1.0 (FLAT) ASCE7-16 \$205-16 (SINAPLE DIAP MEABA, h160°, $825 476520, 330000000000000000000000000000000000$	L'SIMPLIFIED DIRECTIONAL METHOD							
EXPOSURE: C ASCETIE \$267 BASIC SPEED = 112 MPH AKETIE \$20516 $K_{27} = 1.0 (FLAT) ASCETIE $2081 (LASS I BLDE (SIMPLE DIAP MEANEM, hEDD2, 0.2 \le 1/b \le 5.0) ASCETIE $214.2H = 12^{2} - 0^{4}H = 12^{2} - 0^{4}$	<u>LRITERIA</u>							
BASIC SPEED = 112 MPH ASCE 7-16 # 20.5-16 $K_{27} = 1.0 (PLAT) ASCE 7-16 # 20.8-10$ (LATS) I BLD6 (SINNOVE DIAP MEADM, N ± 60°, 0.2 ± 1/6 ± 5.0) ASUE7-16 # 27.4.2 H: 12'-0A LIB RATIO = 30°/24° = 1.25 SAY 1.0 ASCE7-16 # 27.5-1 * USING N= 15 FF IN TABUE Ph = 25.2 RSF Po = 25.2 RSF Po = 25.2 RSF Po = 25.2 (112/115)2 = 24 PSF MIN PRESSURE = 16 PSF ASCE 7-16 # 27.15 BASE SHEAK PAVE = 24 PSF AWALLE = 30°(10°) = 300 FF2 AWALLE = 30°(10°) = 240 FF2 AWALLE = 24°(10°) = 24	RISK: 11 ASCE7-16 T. 1.5-1				~			
$K_{21} = 1.0 (pr.at)$ ASLE 716622.81 $p_0 = 2^{u}p_0 r$ $(LASS BLD6$ $rrrr$ $(SINNOLE DIAP MEADAM, N \pm 60^{\circ}, 0.2 \le 1/b \le 5.0)$ ASLE 716627.14.2 $LOADING DIAGRAM$ $H = 12^{\circ} - 0^{0}$ $I = 30^{\circ} / 24^{\circ} = 1.75$ SAY 1.0 $MALL PEESSUREE$ $C = 115$ MPH ASLET-16 § 275.1 $WALL PEESSUREE$ $C = 115$ MPH ASLET-16 § 275.1 $WALL PEESSUREE$ $C = 115$ MPH ASLET-16 § 275.1 $WALL PEESSUREE$ $C = 115$ MPH ASLET-16 § 275.1 $WALL PEESSUREE$ $C = 115$ MPH ASLET-16 § 275.1 $P_0 = 25.2 \text{ psF}$ $P_0 = 25.2 \text{ psF}$ $P_0 = 25.2 (112 115)^{2} = 24 \text{ psF}$ $P_0 = 25.2 (112 115)^{2} = 24 \text{ psF}$ $P_0 = 25.2 (112 115)^{2} = 24 \text{ psF}$ $P_0 = 25.0 \text{ psF}$ $Pave = 24 \text{ psF}$ $A = 52 \text{ psF}$ $Pave = 24 \text{ psF}$ $A = 52 \text{ psF}$ $Awall = 30^{\circ} (10^{\circ}) = 300 \text{ fr}^{2}$ $Awall = 52 \text{ psF}$ $Awall = 30^{\circ} (10^{\circ}) = 300 \text{ fr}^{2}$ $Awall = 52 \text{ psF}$ $WWMN = 300 \text{ fr}^{2} (24 \text{ psF}) = 72 0 0 \text{ fr}$ $V_{WINP} = 300 \text{ fr}^$	EXPOSURE: C ASCET-16 \$267							
CLASS I BLOB (SINNOLE DIAP HEADIN, 1600, 0.2 \leq ¹ /b \leq ⁵ .0) ASLET-16 \geq ² .4.2 (SINNOLE DIAP HEADIN, 1600, 0.2 \leq ¹ /b \leq ⁵ .0) ASLET-16 \geq ² .4.2 (LOADING DIAGRAM H= 12 ² -0 ⁴ 	BASIC SPEED = 112 MPH ASCE 7-16 F. 26 5-16				Ĺ.			
cLASS I BLOB (sinnole on AP MEALM, hisbor, $0.2 \le 4/b \le 5.0$) ASLET-4/b \$27.4.2 LOADING OLAGRAM H= 12'-0* LIB RATIO = $30^{2}/24^{2}$ = 1.25 SAY 1.0 ASCE7-4/b \$275.1 WALL PRESSURE @ 115 MPH ASCE7-16 T.27.5-1 * USING h= 15 ft W TABUE Ph = 25.2 psF P0 = 25.2 psF	KZT = 1.0 (FLAT) ASLE 7-16\$20.8-1				k –	P0 = 2	upst	
H: $12^{2} - 0^{4}$ LIB RATIO = $30^{2}/24^{2} = 1.25$ SAY 1.0 ASCET-16 § 275.1 WALL PRESSURE @ 115 MPH ASCET-16 T.27.5-1 * USING D = 15 FF IN TABLE Ph = 25.2 PSF P0 = 25.2 PSF P0 = 25.2 (112/115) ² = <u>24 PSF</u> P0 = 25.2 (112/115) ² = <u>24 PSF</u> P0 = 25.2 (112/115) ² = <u>24 PSF</u> P0 = 25.2 (112/115) ² = <u>24 PSF</u> NIN PRESSURE = 16 PSF ASCE 7-16 § 27.1.5 BASE SHEAK PAVE = 24 PSF AWALL = 30 ² (10 ²) = 300 Ft ² AWALL = 30 ² (10 ²) = 300 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 30 ² (1	CLASS I BLDG			-		-		
H: $12^{2} - 0^{4}$ LIB RATIO = $30^{2}/24^{2} = 1.25$ SAY 1.0 ASCET-16 § 275.1 WALL PRESSURE @ 115 MPH ASCET-16 T.27.5-1 * USING D = 15 FF IN TABLE Ph = 25.2 PSF P0 = 25.2 PSF P0 = 25.2 (112/115) ² = <u>24 PSF</u> P0 = 25.2 (112/115) ² = <u>24 PSF</u> P0 = 25.2 (112/115) ² = <u>24 PSF</u> P0 = 25.2 (112/115) ² = <u>24 PSF</u> NIN PRESSURE = 16 PSF ASCE 7-16 § 27.1.5 BASE SHEAK PAVE = 24 PSF AWALL = 30 ² (10 ²) = 300 Ft ² AWALL = 30 ² (10 ²) = 300 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 240 Ft ² AWALL = 30 ² (10 ²) = 30 ² (1	(SIMPLE DIAPHEAGM, NEGO, 0.2 5 465 5.0) ASLET-1002	1.4.2		OADIN	G DIA	GRAM		
WALL PRESSURE © 115 MPH ASCET-16 T.27.51 * USING n=15ft * USING n=15ft Ph = 25.2 PSF	H= 12 ² -0 ⁴							
* USINUS h=15ft IN TABUE Ph = 25.2 psF P0 = 25.2 rsF $P0 = 25.2 (112 / 115)^2 = 24 psF$ $P0^{=} 25.2 (112 / 115)^{2} = 24 psF$ $P0^{=} 25.2 (112 / 115)^{2} = 24 psF$ $P0^{=} 25.2 (112 / 115)^{2} = 24 psF$ MIN PRESSURE = 16 psF ASCE 7-16 # 27.1.5 BASE SHEAR PAVE = 24 psF $A WALL = 30^{\circ} (10^{\circ}) = 300 ft^{2}$ $A WALL = 30^{\circ} (10^{\circ}) = 300 ft^{2}$ $A WALL = 30^{\circ} (10^{\circ}) = 300 ft^{2}$ $A WALL = 30^{\circ} (10^{\circ}) = 240 ft^{2}$	LIB RATIO = 30 / 24 = 1.25 SAY 1.0 ASCE7-16 \$ 275.1							
$Pn^{=} 25.2 (112/115)^{2} = 24p_{5}F$ $Po^{=} 25.2 (112/115)^{2} = 24p_{5}F$ $MiN PRESSURE = 16p_{5}F ASCE 7-16 = 27.1.5$ $BASE SHEAR$ $Pave = 24p_{5}F$ $Awall = 30^{2} (10^{2}) = 300 Ft^{2}$ $Awall = 30^{2} (10^{2}) = 300 Ft^{2}$ $Awall = 24p_{5}F = 240 Ft^{2}$ $Awall = 30^{2} (10^{2}) = 300 Ft^{2}$ $Awall = 30^{2} (10^{2}) = 240 Ft^{2}$ $Awall = 300 Ft^{2} (24p_{5}F) = 7200 Ft$	$P_{h} = 25.2 \ p_{s}F$							
MIN PRESSURE = 16 psf Asce 7-16 $g_{27.1.5}$ BASE SHEAR PAVE = 24 psf A WALL = 30 ³ (10 ³) = 300 ft ² A WALL = 30 ³ (10 ³) = 240 ft ² A WALL = 300 ft ² (24 psf) = 7200 ft VWIND = 300 ft ² (24 psf) = 7200 ft	SLALE TO 112 MIN							
MIN PRESSURE = 16 psf Asce 7-16 $g_{27.1.5}$ BASE SHEAR PAVE = 24 psf A WALL = 30 ³ (10 ³) = 300 ft ² A WALL = 30 ³ (10 ³) = 240 ft ² A WALL = 300 ft ² (24 psf) = 7200 ft VWIND = 300 ft ² (24 psf) = 7200 ft	Pn= 25.2 (112/115) = 24psF							
MIN PRESSURE = 16 PSF ASCE 7-16 \$ 27.1.5 BASE SHEAR PAVE = 24 PSF AWALL = $30^{\circ}(10^{\circ}) = 300 \text{ fr}^2$ AWALL = $30^{\circ}(10^{\circ}) = 240 \text{ fr}^2$ AWALL = $300 \text{ fr}^2(10^{\circ}) = 240 \text{ fr}^2$ AWALL = $300 \text{ fr}^2(24 \text{ PSF}) = 7200 \text{ fr}^2$	P0= 25.2(112 / 115) = 24 p3 F							
Pave = 24 psp Awall = 30°(10°) = 300 ft² Awall = 30°(10°) = 300 ft² Awall = 240°(10°) = 240°ft² Awall = 30° (10°) = 240°ft² Awall = 240°(10°) = 240°ft² Nwind = 30° (t² (24 psf) = 7,200# Awall = 7,200#		√						
$A WALL = 30^{\circ}(10^{\circ}) = 300 \text{ ft}^{2}$ $A WALL = 30^{\circ}(10^{\circ}) = 240 \text{ ft}^{2}$ $A WAL NIS = 24^{\circ}(10^{\circ}) = 240 \text{ ft}^{2}$ $V_{WIND} = 300 \text{ ft}^{2}(24\text{ psf}) = 7200 \text{ ft}$ E/W	BASE SHEAR							
$V_{WIND} = 300 \text{ ft}^2 (24 \text{ psf}) = 7200 \text{ ft}$	PAVE = 24 PSF							
$V_{WIND} = 300 \text{ ft}^2 (24 \text{ psf}) = 7200 \text{ ft}$	$A WALL = 30^{\circ} (10^{\circ}) = 300 Fr^{2}$							
$V_{WIND} = 300 \text{ ft}^2 (24 \text{ psf}) = 7200 \text{ ft}$ F/W	$AWMU_{NJS} = 2\Psi(10^{\circ}) = 240 \text{ f}^{2}$							
$\frac{1}{2} = \frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} \right) = \frac{1}{2} \left(\frac{1}{2} + \frac{1}{2}$	$V_{WIND} = 300 ft^2 (24 psf) = 7,200 ft ft = 1,200 ft$							
\mathbf{N}_{A}				_				

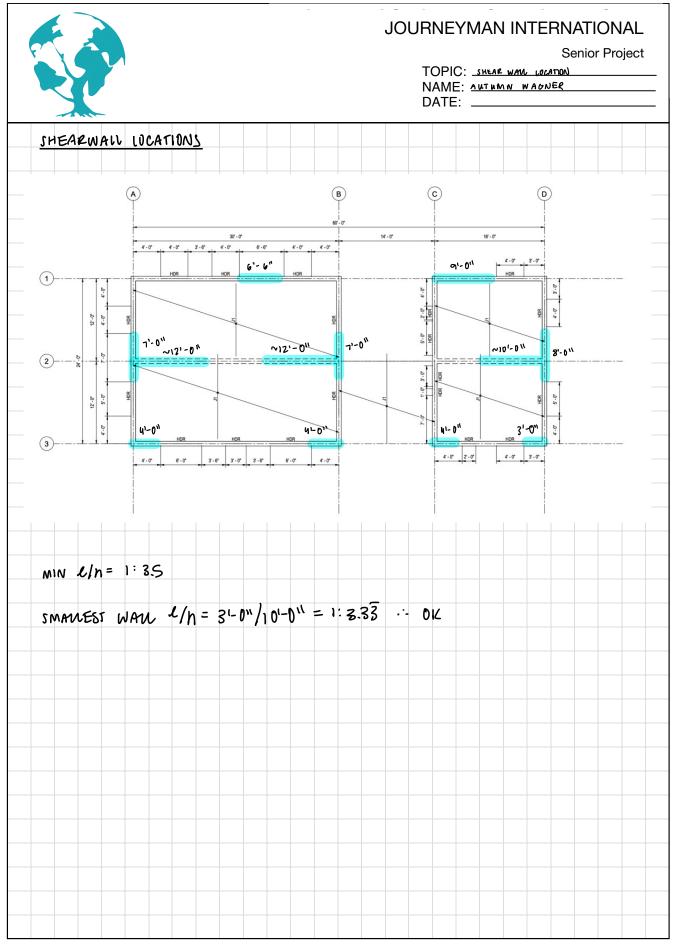
	JOURNEYMAN INTERNATIONAL Senior Project TOPIC: GRAVITY DESIGN NAME: AUTHMN WADNER DATE:
GRAVITY DESIGN	
STUD DESIGN	
LOADS	
D= 17psf (see take OFF)	
L = 20 PSF	
h = 10'-0"	¹⁰ ¹⁰
$TW = 16^{\circ} ec$	
USE 17 PSF (1.33') = 23 PLF	
20 PSF (1.33') = 27 PVF	
WAK: h= 10°-0"	
D= 26 PSF(1.33')= 35 PUF	
$\frac{1}{10} TOTAL = 23 PLF + 27 PLF + 35 PLF = 85 PLF$	
WIND = 24psf (0.6)(1.33) = 19plf	
ASD	
DESIGN LIMITS	
COMPRESSIVE WAD $P = 85PVF(10^{\circ}-0^{\circ})$	
= <u>850 #</u> WIND MOMENT M= 19 PUF(10'-0")2/8	
= 238#)	
SIZE USING AXIAL LIMIT	
$f_{L^{2}} P/A$	
$\therefore A = P \int f_{L}$	
fc* = fc cd	
USE FU = 1650 PSi (SOUTHERN PINE NO	
$fc^{+} = 1650 \text{ psi}(1,0) = 1650 \text{ psi}$	
: A= 850 #/ 1650 ps; 0.52 in 2	
TRY 2×4 STUDS	
$A = 5.25 \ln^2, S = 3.06 \ln^3$	

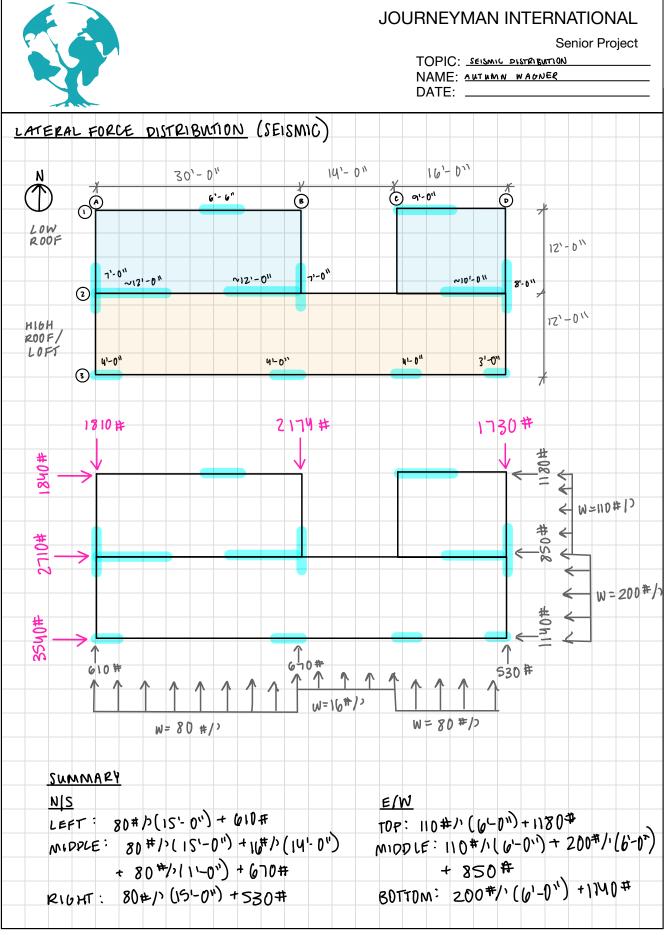
		J	T(N/	NEYMAN DPIC: <u>68 AY</u> AME: <u>447 144</u> ATE:	TY DESIGN	Senior Pro	
GRAVITY DESIGN							
STND DESIBN							
MODIFICATION FACTORS	REFERENCE	VALUES					
Col= 1. 0 NDS 23.2	Fc= 1650 psi		NDS	TABLE 4B			
C1 = 1.0 NDS 3.3.3	Fb= 1350 psi		NDS	TABLE 4B			
CF = 1.1 (Fb) NDS 4.3.6	Eminž 580,00	0 psi	NDS	TABLE 4B			
Cr = 1.0 NDS 43.9							
CE = 1.0 NDS 2.3.3							
Cm = 1.0 NDS 4.14, 5.14							
CALC CP NDS SUPP. 3.7.1							
le/d= 10-0"(17"))/35"							
= <u>34</u> 450 . ok							
FCE = 0.822 Emin							
(le/d) ²							
= 0.822 (580,000psi) =	<u>412</u>						
342							
Fot = fc cd cf = 1650psi (1.0)(1.1) = 1815psi	_					
$\therefore C_{p} = \frac{1+F_{ve}/F_{c+}}{2c} - \sqrt{\left(\frac{1+F_{ve}}{2c}\right)^{2}}$	re/Fot)- FOE/FOR)					
2.0 16	2c / c						
C= 0.8 (SAWN LUM	BER)						
$\therefore c\rho = 0.98$							
CALC CE NOS SUPE 3.3.3							
lu/d= <u>34</u> ≥7:0×							
le = 1.63 lu + 3 d							
= 1.63 (34) + 3(5.5') = 72							
RB= 7 led/b2 = 7 72(55)/15" =	13.3						
$FBE = 1.2Emin / PB^2$							
= 1.2 (580,000 psi) 13.32 = 3	5955ps;						
$Fb^{*} = Fb CACF = 1350psi (1.0)(1.1)$	- 1485 psi						
$C_{L} = \frac{1 + F_{BE} / F_{b^{*}}}{1.9} - \sqrt{\left[\frac{1 + F_{BE} / F_{b^{*}}}{1.9}\right]}$	2_fde/f6						
1.9 1.9 3	0.95						
.: c1= 0.97							

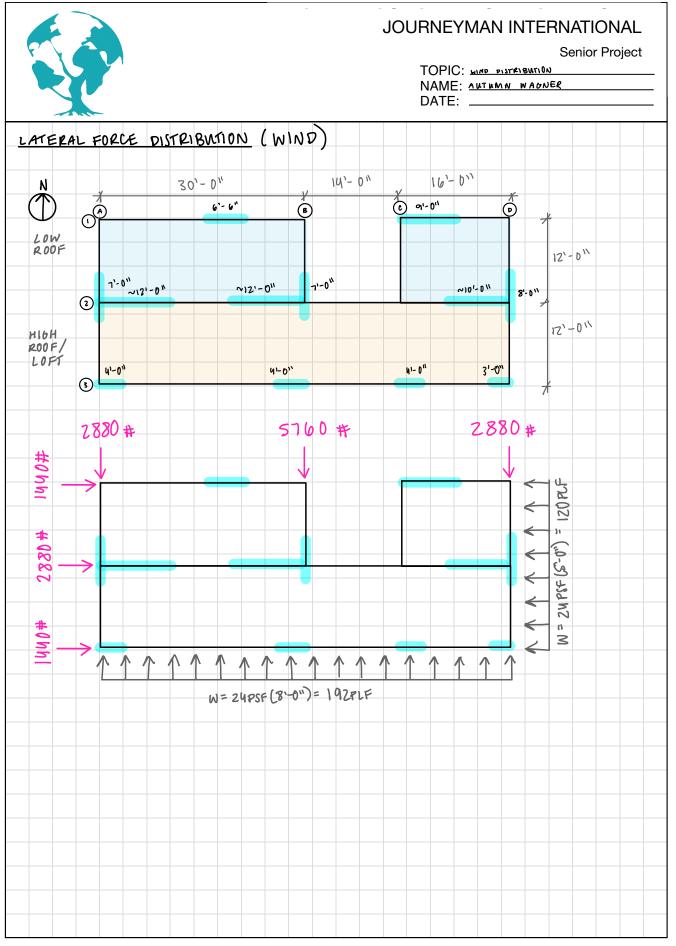


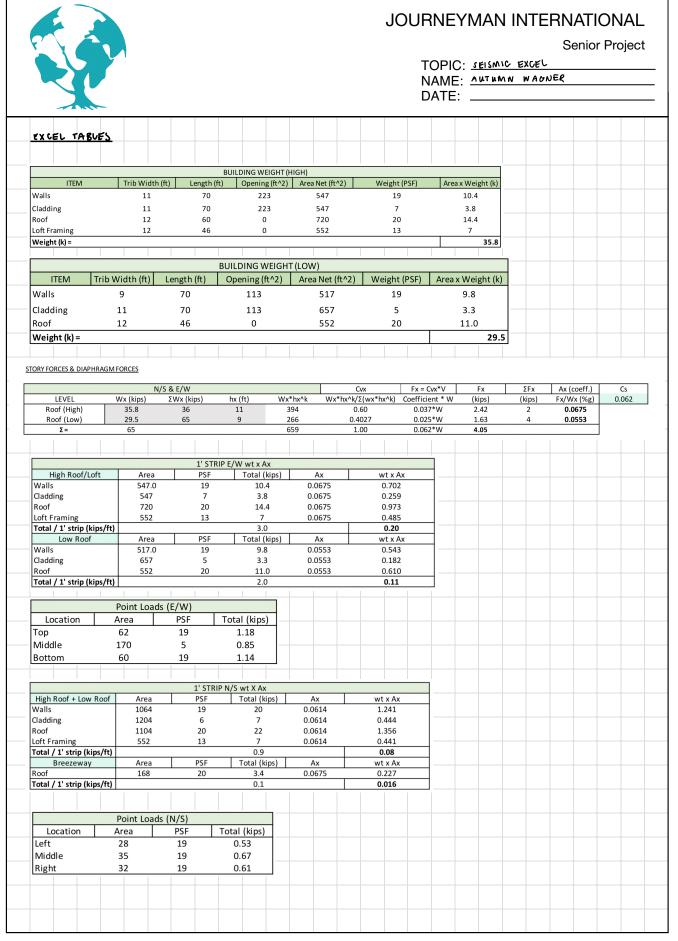
	JOURNEYMAN INTERNATIONAL Senior Project TOPIC: <u>GRAYITY DESIGN</u> NAME: <u>AUTUMN WADNER</u> DATE:
GRAVITY DESIGN	
FOOTING DESIGN	
WSIN 6 IBC T. 1806.2 fb = 1500 psf	
*ASSUMING CLAY/SILTY CLAY BIC OF	
EXISTING BORING REPORT AND	
GEDGRAPHIC AREA	
$\sigma = P/A$ $\therefore A = P/\sigma$	
P= 850 # (SEE STND CALCULATIONS)	
∴ A= 850 #/ ISOO PSF	
= <u>0.0</u> '	
18C 1809.4 -> MIN WIDTH 15 12"	
MIN DEPTH IS 12"	
USE 12" WIDE BY 18" DEEP CONTINUOUS FOOTINUS	

PROJECT NAME: Senior Project Jonestown, Mississipi Image of Sector 1 Accelerations (%g) Image of Sector 1 Acceleration (%g) Image of Sector 1 Acce			TOPIC: <u>LATER</u> NAME: <u>Autu</u> DATE:	
PROJECT LOCATION: Sensit: Popped Image: Popped Sectial Accelerations (Name) Image: Popped Sectial Acceleration Sectial Name) Image: Popped Sectial Name) Ima	SMIC COEFFICIENTS #	r design valve		
Site Class D beign Site Class Fit FV Design Site Class Fit FV Adjusted Maximum Considered EQ (MCE) Spectral Response Acceleration Parameters (ASCE 7-16/11.4.4) Adjusted Maximum Considered EQ (MCE) Spectral Response Acceleration Parameters (ASCE 7-16/11.4.4) Site Class Fit Class Design Spectral Acceleration Parameters (ASCE 7-16/11.4.4) Site Class for Seismic Force-Resisting System (ASCE 7-16/12.2) Response Modification Coefficient, R 6.5 System Overstringth Factor, C, J A Design Coefficients and Factors for Seismic Force-Resisting System (ASCE 7-16/12.2) Response Modification Coefficient, R 6.5 System Construction Factor, C, J A Importance Factor (ASCE 7-16/15.2) Nature of Occupancy per Table 16041.5: Building and other structures accept these listed in Risk Categories I, III and IV Cocupancy (ASCE 7-16/11.8) Design Category based on SD1: D 171.6.1 Design Category	PROJECT NAME: PROJECT NAME: PROJECT LOCATION:	Senior Proj	ot	
9s = 0.5 Design Site Class Table 11.4.1 Table 11.4.2 2.30 Adjusted Maximum Considered EQ (MCE) Spectral Response Acceleration Parameters (ASCE 7-16./ 11.4.9)	Mapped Spectral Acceleration	ons (%g)	Site Coefficients (%g)	
38 = 0.3 1abe 11.4.1 1abe 11.4.2 1.2 2.30 Adjusted Maximum Considered EQ (MCE) Spectral Response Acceleration Parameters (ASCE 7-16 / 11.4.4)	Site Class D		Pagign Site Class Fa Fv	
Adjusted Maximum Considered EQ (MCE) Spectral Response Acceleration Parameters (ASCE 7-16 / 11.4.4) SMS = r^{10} s = 0.6 SM1 = Fv'S1 = 0.345 Design Spectral Acceleration Parameters (ASCE 7-16 / 11.4.5) SD5 = 2/3*S8 = 0.4000 SD1 = 2/3*SM1 = 0.2300 Design Coefficients and Factors for Seismic Force-Resisting System (ASCE 7-16 / 12.2) Response Modification Coefficient, R 6.5 System Overstreem Factors (0 3 Deflection Amplification Coefficient, R 6.5 System Overstreem Factors (0 3 Deflection Amplification Factor, C, 0 3 Deflection Amplification Factor, C, 0 4 System Umitations (ft) 65 Importance Factor, IASCE 7-16 / 1.5.2) Nuture of Occupancy per Table 16041.5: Buildings and other structures except those listed in Risk Categories I, III and IV Occupancy Centre (Category: III) Importance Factor, I: 1.0 Selsmic Design Category Nased on SD1: D T11.6-1 Design Category Nased on SD1: D D T11.6-2 Design Category Nased on SD1: D D </td <td></td> <td></td> <td>Table 11.4-1 Table 11.4-2</td> <td></td>			Table 11.4-1 Table 11.4-2	
$\begin{aligned} & \text{SNS} = \text{Fa}^* \text{Ss} = & 0.6 \\ & \text{SM1} = \text{Fr}^* \text{S1} = & 0.345 \\ & \text{Design Spectral Acceleration Parameters (ASCE 7-16 / 11.4.5)} \\ & \text{SD5} = 237 \text{SM1} = & 0.2300 \\ & \text{Design Coefficients and Factors for Seismic Force-Resisting System (ASCE 7-16 / 12.2)} \\ & \text{Response Modification Coefficient, R} & 6.5 \\ & \text{System Overstength Factor, Q, 0} & 3 \\ & \text{Defection Argintation Factor, Q, 0} & 4 \\ & \text{System Limitations (ft)} & 65 \\ & \text{Importance Factor (ASCE 7-16 / 15.2)} \\ & \text{Nature of Occupancy Der Table 16041.5:} \\ & \text{Buildings and Otscupancy Der Table 16041.5:} \\ & \text{Building and Otscupancy Der Table 16041.5:} \\ & \text{Design Category Dased on SDS: D T 111.6-1 \\ \\ & \text{Design Category Dased on SDS: D T 111.6-1 \\ & \text{Design Category Dased on SDS: D T 111.6-1 \\ \\ & \text{Design Category Dased on SDS: D T 111.6-2 \\ & \text{Design Category Dased on SDS: D T 112.8-2 \\ & \text{A} = & 0.75 & T12.8-2 \\ & \text{A} = & \text{COM T2.8-2} \\ & \text{COM T2.8-2} \\ & \text{COM T2.8-2} \\ & \text$	S1 =	0.15	D - Default 1.2 2.30	
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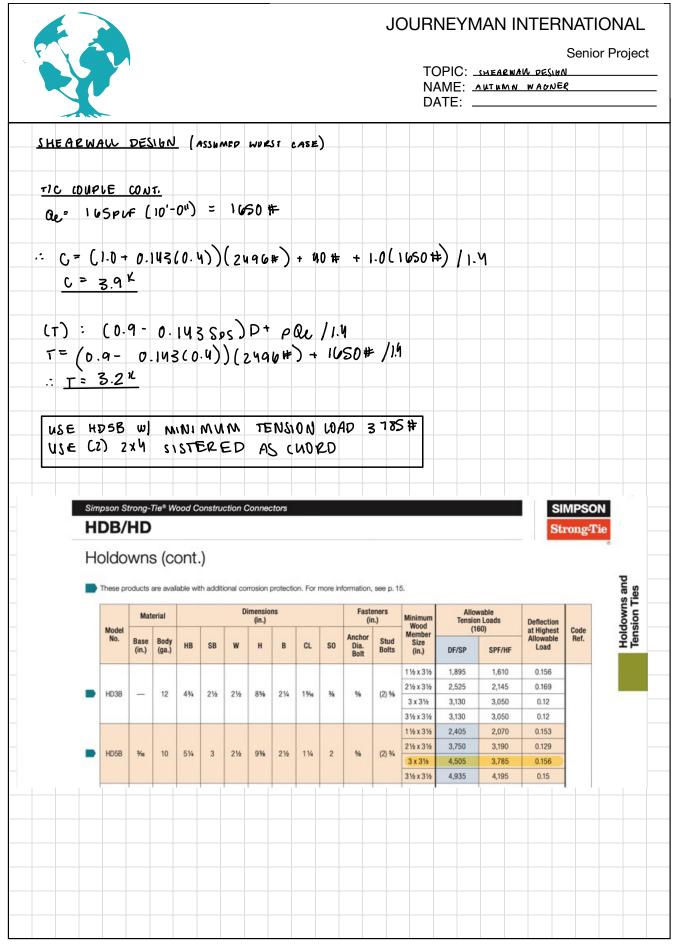


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= 8	23 PLF (0.6) = 494 PLF	
SDPWS T.	4.3A USE 3/8" WOOD STRUCTARAL PANELS W/ 8d NAILS C 4" OC	
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SDPWS T.U	$\begin{array}{c} \textbf{I.3A} & \textbf{use} & \textbf{3J8}^{n} & \textbf{woop} & \textbf{structureal panels} & \textbf{w} \end{bmatrix} & \textbf{8d} & \textbf{NAUS} & \textbf{C} & \textbf{0}^{n} & \textbf{0}C \\ & \textbf{vw} &= \textbf{730J2} &= \textbf{36Sput} & \therefore & \textbf{0K} \checkmark \end{array}$ $\begin{array}{c} \textbf{N} & \textbf{V} & $	
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SDPWS T.U <u>E/W</u> GOVEZNI.	$\begin{array}{c} 1.3A & use 318^{n} & woop \ structureal \ PANELS \ w \end{array} 8d \ NAUS \ C \ G^{n} \ OC \\ & vw = 730/2 = 365 \ PuF \ \therefore \ OK \ \end{array}$ $\begin{array}{c} N \ Use \ SE^{n} \ SM^{n} \ C \ SM^{n} \ SM^{n}$	
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JOURNEYMAN INTERNATIONAL

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	NAME: DATE:		N WAGNER		
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SHEARWALL DESIGN (ASSUMED WORST CASE)					
10'. D'					
A 4 ² -0 ³					
LIADS					
WD= Wwall + Wroof					
$= 19 p_{s} f (4 - 0^{n}) + 20 p_{s} f (10^{1} - 0^{n})$					
= 274 pr =					
WL= WLR					
$= 20 \text{ psf} (10^{\circ} - 0^{\circ})$					
= <u>200 pvf</u>					
Wror = <u>533 PUF</u>					
$Pwall = 1.9psf(4^{-0})(10^{-0})$					
~ 760 ff					
$R_{D}^{=} W_{D} \mathcal{L} / 2 = \frac{552 \#}{400 \#}$ $R_{1}^{=} W_{1} \mathcal{L} / 2 = \frac{400 \#}{100 \#}$					
$R_{2} = W_{1} \lambda / 2 = 400 \#$					
TIC CONPUE					
(c) = (1.0 + 0.143 Sos) D+ L+ \$ + pac/1.4					
$(1) \cdot (1.07 \ 0.145 \ 505) \ D \cdot C \cdot S + \mathcal{D} \cdot \mathcal{U}(1.17)$					
$8 M_{P}^{(0)} = 0 = P_{WAH} (2' - 0'') + W_{O} (4' - 0'') (7' - 1'') + R_{O} (2' - 1'')$					
$= 1330 \pm (2'-0'') + 333 pup (4'-0'')(2'-0'')$	+ 1145#	(4°-0") - ((4-	0")	
$C_{D} = 2490 \#$					
$Z M t^{9} = 0^{2} W t (u^{2} - 0^{2})(z^{2} - 0^{2}) - C(u^{2} - 0^{2})$					
= 20 psf(4'-0'')(2'-0'') - C(4'-0'')					
$C_{L} = \underline{N0\#}$					



SECTION 3.0 : DRAWING PACKAGE

GENERAL STRUCTURAL NOTES

GENERAL

- A. EXISTING CONDITIONS THE CONTRACTOR IS RESPONSIBLE TO VERIFY EISTING SITE CONDITIONS AND UTILITIES TO DETERMINE WHETHER THERE IS A CONFLICT.
- B. MEANS AND METHODS, RESPONSIBILITY CONSTRUCTION DOCUMENTS REPRESENT THE FINISHED STRUCTURE. CONTRACTOR IS SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, SEQUENCES AND OSHA SAFETY PRECAUTIONS, INCLUDING BUT NOT LIMITED TO SHORING AND TEMPORARY BRACING.
- C. DIMENSIONS USE WRITTEN DIMENSIONS ONLY. VERIFY ALL DIMENSIONS AT JOB SITE BEFORE COMMENCING WORK AND REPORT ANY DISCREPANCIES. WHERE NO DIMENSIONS ARE PROVIDED OBTAIN CLARIFICATION PRIOR TO PROCEEDING WITH WORK.
- D. COORDINATION OPENINGS THROUGH WALLS AND FLOORS FOR MECHANICAL AND ELECTRICAL SYSTEMS SHALL BE COORDINATED BY CONTRACTOR AND CONSTRUCTED PER TYPICAL DETAILS SHOWN IN THESE DOCUMENTS. NO MECHANICAL OR ELECTRICAL SYSTEM COMPONENTS SHALL BE EMBEDDED IN SLABS OR WALLS UNLESS SPECIFICALLY DETAILED IN THESE DOCUMENTS.
- E. OMISSIONS AND CONFLICTS OMISSIONS OR CONFLICTS BETWEEN VARIOUS ELEMENTS OF THE CONSTRUCTION DOCUMENTS SHOULD BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM. IF CERTAIN FEATURES ARE NOT FULLY DELINEATED IN THE CONSTRUCTION DOCUMENTS, THEIR CONSTRUCTION SHALL BE OF THE SAME CHARACTER AS FOR SIMILAR CONDITIONS THAT ARE DELINEATED.
- F. STRUCTURAL DRAWINGS ARE INTENDED TO BE USED WITH ARCHITECTURAL AND MECHANICAL DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING SUCH REQUIREMENTS INTO THEIR SHOP DRAWINGS AND WORK.
- G. NO CHANGE IN SIZE OR DIMENSION OF A STRUCTURAL MEMBER, NOR SHALL ANY OPENINGS BE MADE IN ANY STRUCTURAL MEMBER, WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
- H. THE CONTRACTOR IS RESPONSIBLE FOR LIMITING THE AMOUNT OF CONSTRUCTION LOAD IMPOSED UPON STRUCTURAL FRAMING. CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN CAPACITY OF THE FRAMING AT THE TIME THE LOADS ARE IMPOSED.
- THE CONTRACTOR SHALL INFORM THE ENGINEER. IN WRITING OF ANY DEVIATION FROM THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL NOT BE RELIEVED OF THE RESPONSIBILITY OF SUCH DEVIATION BY THE ENGINEER'S REVIEW OF: SHOP DRAWINGS, PRODUCT DATA, ETC., UNLESS THE CONTRACTOR HAS SPECIFICALLY INFORMED THE ENGINEER OF SUCH DEVIATION AT THE TIME OF SUBMISSION, AND THE ENGINEER HAS GIVEN WRITTEN APPROVAL TO THE SPECIFIC DEVIATION.
- SEE DRAWINGS OTHER THAN STRUCTURAL FOR: TYPES OF FLOOR FINISH AND THEIR LOCATION, FOR DEPRESSIONS IN FLOOR SLABS, FOR OPENINGS IN WALLS AND FLOORS REQUIRED BY ARCHITECTURAL AND MECHANICAL FEATURES, FOR ROADWAY PAVING, WALKS, RAMPS, STAIRS, CURBS, ETC.
- DESIGN BASIS
- A. APPLICABLE CODE: ASCE 7-16.
- B. VERTICAL LOADS:
 - 1. HABITABLE ATTIC (LOFT): 30 psf 2. ROOF LIVE LOAD: VARIES WITH SLOPE (20 psf max.)
- C. LATERAL LOADS: 1. SITE LOCATION:
 - JONESTOWN, MISSISSIPPI
 - 2. DESIGN SEISMIC CRITERIA: SITE CLASS: D SDS = 0.4gSD1 = 0.3gIMPORTANCE FACTOR, I= 1.0 SEISMIC DESIGN CATEGORY = D OCCUPANCY CATEGORY = II RESPONSE MODIFICATION COEFF., R= 6.5 REDUNDANCY FACTOR = 1.0 DESIGN SEISMIC COEFF., V= 0.062 W, W (N-S, E-W STRENGTH)

 - 2. DESIGN WIND CRITERIA: <u>RISK: II</u> EXPOSURE = C BASIC SPEED = 112 MPH WIND PRESURE = 24 PSF K_{ZT} = <u>1.0 (FLAT)</u>
- D. GEOTECHNICAL CRITERIA:
 - 1. SOIL PROPERTIES ARE NOT KNOWN IN SUFFICIENT DETAIL TO DETERMINE SITE CLASS THEREFORE SITE CLASS D WAS USED.
 - 2. ALLOWABLE SOIL BEARING PRESSURE:
 - DEAD + LIVE: 1500 psf PER IBC TABLE 1806.2

MATERIALS

WOOD

MATERIAL AND WORKMANSHIP PER AWC NAT MATERIAL SPECIFICATIONS, TYP. UNO. 2x STUDS AND BLOCKING SOUT 2x JOISTS AND RAFTERS SOUT SOUT 4x,6x,8x

CONCRETE

MATERIAL AND WORKMANSHIP PER ACI 318-19 MATERIAL SPECIFICATIONS, TYP. UNO.

> PAD FOOTINGS f'c = 2500 psi SLAB ON GRADE fc = 3000 psi GRADE BEAMS f'c = 3000 psi

ELEVATED DECKS fc = 3000 psi ALL CONCRETE IS NORMAL WEIGHT

REINFORCING STEEL

MATERIAL AND WORKMANSHIP PER ACI 301

MATERIAL SPECIFICATIONS, TYP. UNO. REINFORCING STEEL PER ASTM A615 GRADE 60 WELDING REINFORCING PER ASTM A706 WELDED WIRE MESH PER ASTM GRADE 65

STRUCTURAL TESTS AND INSPECTIONS

SPECIAL INSPECTIONS AND TESTING PER IBC CHAPTER 17 SPECIAL INSPECTIONS PERFORMED BY: _____

> FOUNDATION: GRADING, COMPACTED FILL, EXCAVATIONS

CONCRETE: PLACEMENT OF 2500 psi CONCRETE OR STRONGER

CYLINDER TESTS OF 2500 psi CONCRETE OR STRONGER REINFORCING STEEL:

WOOD: CONSTRUCTION OF HIGH-LOAD DIAPHRAGMS

TIONAL DESIGN SPECIFI	ICATION
JTHERN PINE #1 JTHERN PINE #1 JTHERN PINE #1	MAX. MOISTURE CONTENT 19% 19% 19%
9	
Г (150 pcf) UNO	

PLACEMENT OF REINFORCING STEEL IN 3000 psi CONCRETE OR STRONGER

STRUCTURAL SHEET INDEX

- S.0 GENERAL STRUCTURAL NOTES
- FOUNDATION PLAN S.1
- S.2 LOFT FRAMING PLAN
- S.3 ROOF FRAMING PLAN

ABBREVIATIONS

LONGITUDINAL TRANVERCE LIGHT WEIGHT MAXIMUM MECHANICAL MINIMUM NEW NORMAL WEIGHT NOT TO SCALE ON CENTER OPPOSITE PLATE PLYWOOD POST TENSIONING ROUGHENED CONSTRUCTION JOINT REINFORCEMENT REQUIRED SEE ARCHITECTURAL DRAWINGS SEE CIVIL DRAWINGS SCHEDULE SEE DRAWINGS BY OTHERS SIMILAR SEISMIC JOINT SEISMIC LOAD RESISTING SYSYEM SEE MECHANICAL DRAWINGS SPECIFICATION SQUARE SYMMETRICAL TOP AND BOTTOM TONGUE AND GROOVE TOP OF TOP OF CONCRETE TOP OF FINISH TOP OF STEEL FRAMING TOP OF PLATE TYPICAL UNLESS NOTED OTHERWISE VERTICAL VERIFY IN FIELD WITH WITHOUT



JOURNEYMAN INTERNATIONAL

1 Grand Ave. San Luis Obispo CA, 93401

INFO:

JOURNEYMAN INTERNATIONAL SENIOR PROJECT

ADVISOR: PROFESSOR JOHN LAWSON

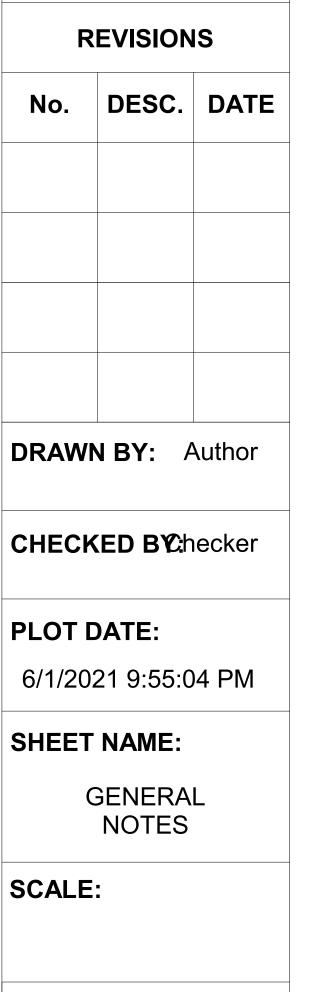
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PROJECT:

DWELL BEING

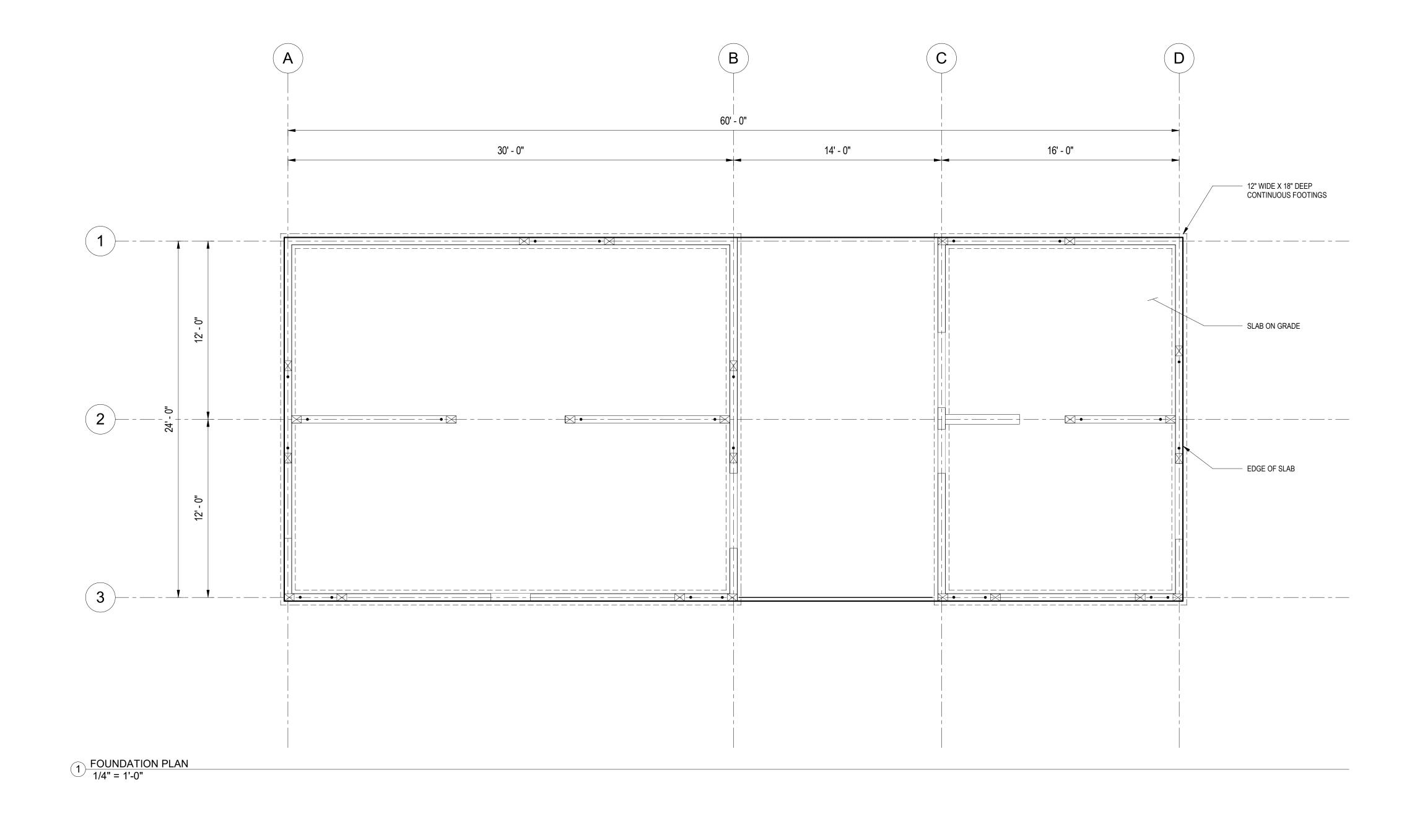
SITE:

JONESTOWN, MISSISSIPPI



SHEET No.:

S.0





JOURNEYMAN INTERNATIONAL

1 Grand Ave. San Luis Obispo CA, 93401

INFO:

JOURNEYMAN INTERNATIONAL SENIOR PROJECT

ADVISOR: PROFESSOR JOHN LAWSON

> DATE: 6/1/2021 9:55:05 PM

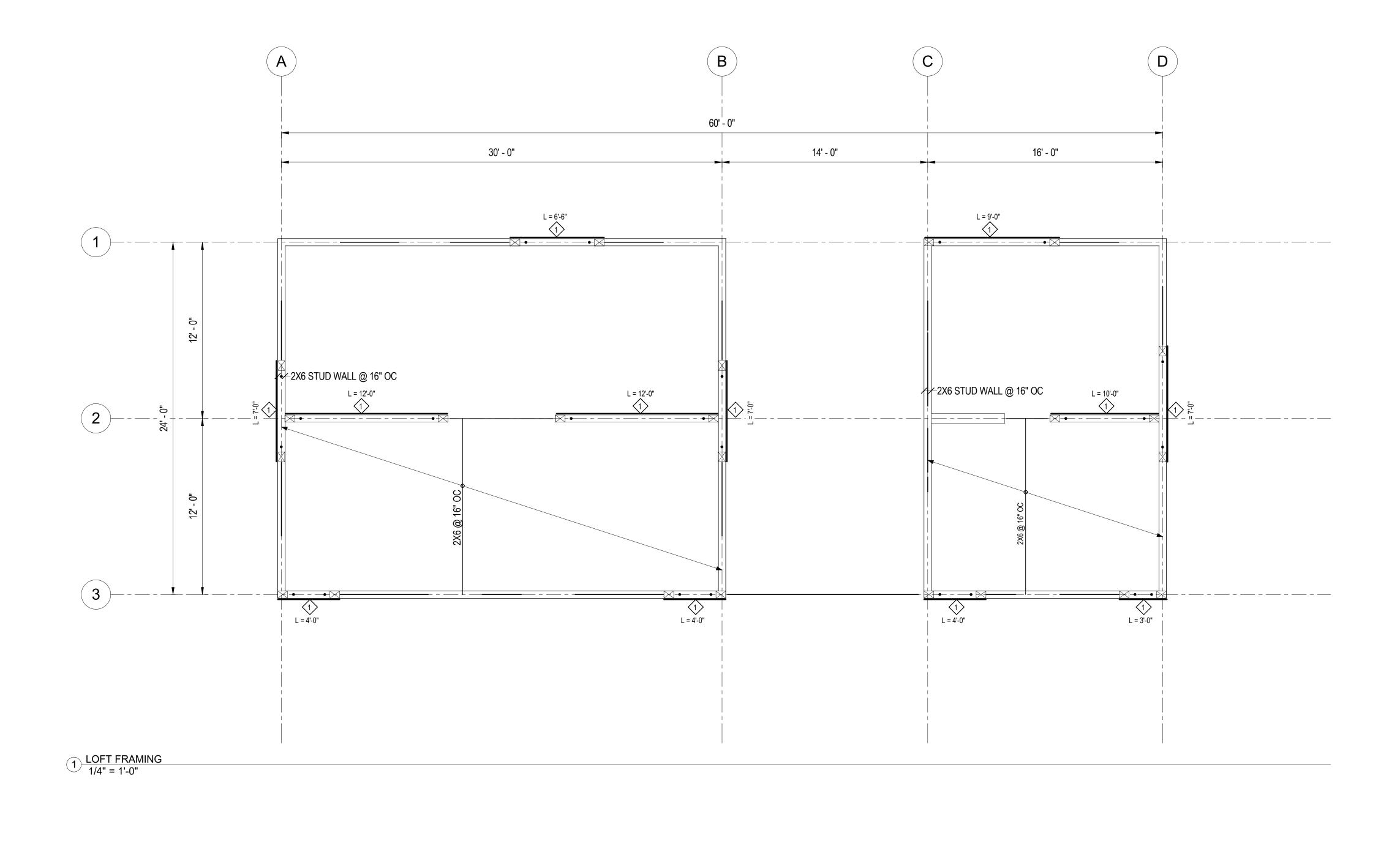
PROJECT:

DWELL BEING

SITE:

JONESTOWN, MISSISSIPPI

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FOUNDATION PLAN			
SCALE:			
1/4" = 1'-0"			
SHEET No.:			
S.1			





JOURNEYMAN INTERNATIONAL

1 Grand Ave. San Luis Obispo CA, 93401

INFO:

JOURNEYMAN INTERNATIONAL SENIOR PROJECT

ADVISOR: PROFESSOR JOHN LAWSON

> DATE: 6/1/2021 9:55:05 PM

PROJECT:

DWELL BEING

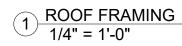
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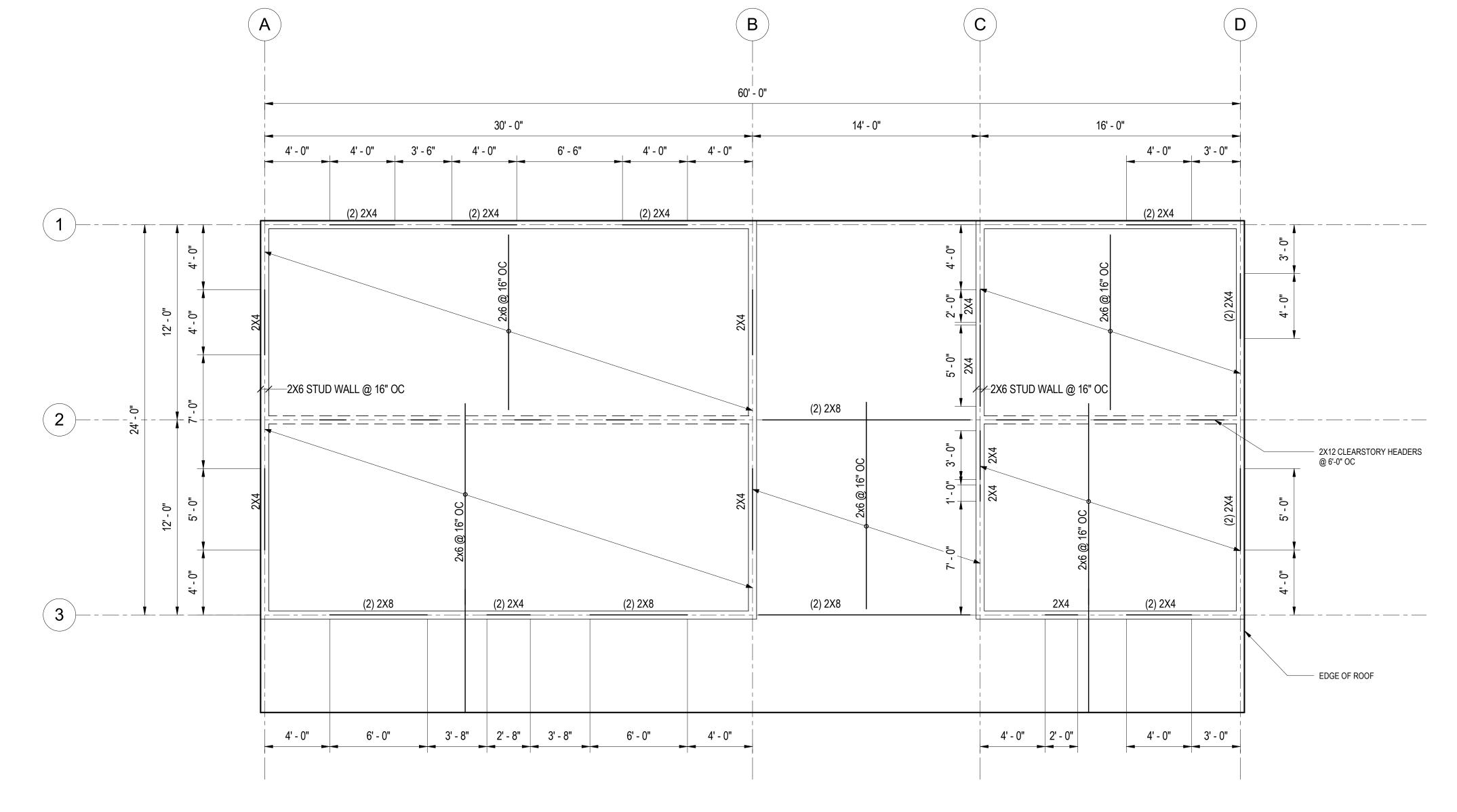
JONESTOWN, MISSISSIPPI

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SHEET NAME:			
LOFT FRAMING PLAN			
SCALE: 1/4" = 1'-0"			

SHEET No.:

S.2







JOURNEYMAN INTERNATIONAL

1 Grand Ave. San Luis Obispo CA, 93401

INFO:

JOURNEYMAN INTERNATIONAL SENIOR PROJECT

ADVISOR: PROFESSOR JOHN LAWSON

> DATE: 6/1/2021 9:55:05 PM

PROJECT:

DWELL BEING

SITE:

JONESTOWN, MISSISSIPPI

REVISIONS			
No.	DESC.	DATE	
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ROOF FRAMING PLAN			
SCALE:			
1/4" = 1'-0"			

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SECTION 4.0 : ALTERNATIVE SOLUTION FOR AFFORDABLE HOUSING IN JONESTOWN, MISSISSIPPI

An affordability study supplementing a completed design project in Jonestown, MS with students from California Polytechnic State University in San Luis Obispo.

Jonestown, Mississippi Summary

General Size: 0.4 square miles Population: 1,124 Age: 28% under 18 / 66% age 18 - 64 / 6% over 65 Sex: 56% female / 44% male Ethnicity: 100% black Economics Per Capita Income: \$10,372 Median Household Income: \$17,596 Persons Below Poverty Line: 46.8% / 523 persons Common Occupations: Retail / Recreation / Social Assistance Housing No. Of Units: 512 / 86% occupied / 14% vacant Ownership: 56% renter occupied / 44% owner occupied Type of Structure: 47% single unit / 31% multi-unit / 22% mobile home Value of Owner Occupied Units: \$45,300 median / 92% under \$100k / 8% above \$100k

Access to Housing

Access to affordable housing is extremely important for an individual's pursuit of education, community involvement, and overall autonomy. The U.S. Department of Housing and Urban Development (HUD) measures the affordability of housing based on the percentage of income that individuals spend on housing. Houses are considered unaffordable if the cost surpasses the 30 percent threshold, or 30 percent of income (Defining Housing Affordability: HUD USER). The 2019 US Census report found that the official poverty rate nationally was 10.5 percent and that the overall national median income for men was \$57,456 and \$47,299 for women (Bureau, US Census. Income...). The US Department of Health and Human Services defines poverty thresholds for two person, three person, and four person household incomes at \$17,240, \$21,720, and \$26,200 respectively. Jonestown is a small 0.4 square mile town located in Coahoma County, Mississippi with a population of 1,124 people, almost 100 percent black. The 2019 census reported that 46.8 percent of people in Jonestown live below the poverty line (Census Profile: Jonestown, MS). Following the 30 percent HUD rule, the median

1

household income of \$17,596 in Jonestown leaves families housing burdened after spending about \$5,280 (0.3 x \$17,596) on housing a year.

The median value of owner occupied housing in Jonestown is \$42,100 (Census Profile: Jonestown, MS). With a Federal Housing Administration mortgage loan with 10 percent downpayment, the average family in Jonestown, Mississippi would need to pay a little more than \$4,000 down, plus monthly mortgage payments which meet or surpass the 30 percent threshold. An average 30 year fixed loan in the US in 2021 has a 3.36% interest rate, which approximates a monthly payment of \$200 (Tarpley, Laura Grace). While houses valued at about \$40,000 in Jonestown can be afforded, there are no new homes being built because they cannot afford to be built. Therefore this is little to no access to new and improved housing because the cost is higher than what is existing and can be afforded. For instance in comparison, the overall average purchase price of single family housing in Mississippi is slightly more than \$130,000 for a mortgage, much higher than many families in Jonestown could afford (Tarpley, Laura Grace). Finding affordable housing is important because families, like those in Jonestown, often have to spend so much of their earnings on housing that they often have to choose between other basic necessities such as food and healthcare. There are negative psychological effects not only on adults but for the development and well being of children as well.



Figure 1: Household income in Jonestown compared to the US https://datausa.io/profile/geo/jonestown-ms#household_income

Designer Impact

What impact do architectural and structural designers have on the affordability of a structure? The typical cost breakdown of a project attributes 10-20 percent of costs to purchasing the land, 20-30 percent of costs for design, engineering, financing/permitting, and 50-70 percent of costs for construction, labor, and materials (Hoyt, Hannah). Architects and developers have the most influence on the affordability because they make the initial decisions that impact the 50-70 percent hard costs. Developers decide how much profit they want to make and therefore the demographic of people who can afford their product. Architects influence the program and aesthetic of a building, and where the engineers can add structural elements. This all impacts the ability to make an economically efficient structure. Ways to reduce costs include lowering MEP cost by setting up back to back plumbing and correctly positioning windows and glass to avoid inefficient sun exposure. Architects can also select building finishes that are less costly. Engineers can work to select the most cost effective and efficient designs to satisfy the architect and client. By working on a project from the beginning, collaboration with the engineer can help ensure that costs remain as low as possible.

One solution to increase the affordability of a home is by utilizing prefabricated systems and offsite construction. For example, manufactured homes are typically less expensive than a custom built home. The Current Manufactured Housing Survey from the US Census reported that in 2020 the average sales price of a new manufactured double home in the South was \$109,900 (Bureau, US Census. Current...). A typical double wide manufactured home is at least 20 feet wide and a maximum of 90 feet long. To transport a double wide homes requires that the home travels in two separate components, not exceeding 14 feet in width or 90 feet in length. These two pieces are then joined together at the site (Over-Dimensional Permits). Applying this methodology can be an effective method to reduce costs with a desirable manufactured house that is not inferior nor unsafe.

3

Dwell Being

Dwell Being, a project in Jonestown, Mississippi with Journeyman International, But God Ministries, and Third Lens Ministries seeks to find an affordable and resilient housing solution. The student architect designed a 24 foot by 60 foot duplex that can be utilized as two separate households, one for a single individual or couple, and the other for a small family. The duplex can also be purposed for a multigenerational household across both units. This is important because census data suggests that not many people move out of Jonestown. Only 68.6 percent of individuals graduate high school compared to 85.3 percent of individuals in Mississippi and 88.6 percent nationally. Additionally, Jonestown has a disproportionately high percentage of individuals under 18 in poverty at 59 percent compared to 28 percent in Mississippi and 17 percent nationally (Census Profile: Jonestown, MS). The project is very similar to a Southern dogtrot style home with two enclosed spaces separated by a breezeway, all under the same roof. Both sides of Dwell Being have a loft structure providing additional space, very similar to a traditional auxiliary dwelling unit (ADU). What if Dwell Being was a creative and architecturally aesthetic manufactured home? Would the cost differential of a manufactured unit be significant?

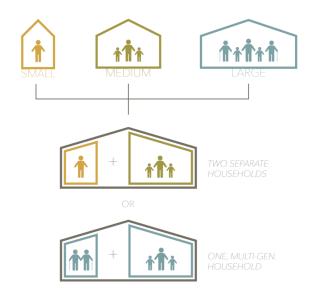


Image 1: Housing concept

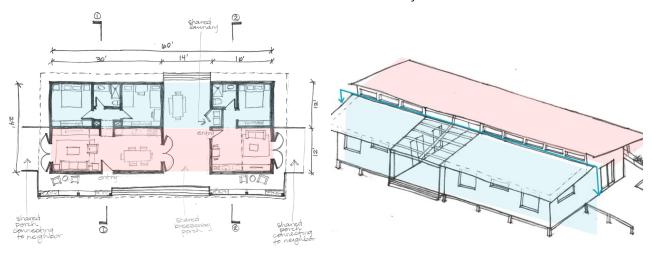


Image 2: Example of dogtrot style home



Image 3: Dwell Being rendering

The estimated cost for Dwell Being taken from the student project manager is \$175,000 - \$200,000. The cost of a similarly designed manufactured home is approximately \$100,000 plus the transportation of the manufactured home from a factory (Bureau, US Census. Current...). The closest manufacturers near Jonestown, Mississippi are anywhere from 60 to 160 miles away. With an average cost of about \$10 per mile of transportation per vehicle, the additional added cost is anywhere from \$600 to \$1,600 per vehicle. The Mississippi Department of Transportation would require a manufactured home similar to Dwell Being to be transported on two separate trucks, each carrying a 12 foot by 60 foot section of the structure, with a front escort (Over-Dimensional Permits). If the manufacturing factory is out of Mississippi, the costs of transportation can be up to \$20,000. Even with this additional cost, Dwell Being is still 40 percent more expensive being built on site. However, with an increase in manufactured homes it can be assumed that distance to a manufacturer would not be too far away.



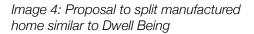
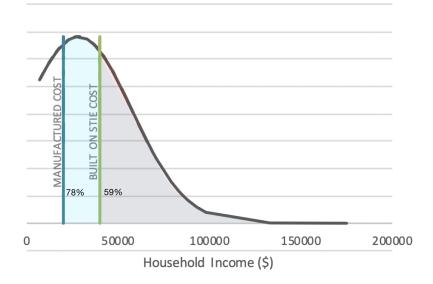


Image 5: 3D section view

Theoretically, the decrease in cost of manufacturing Dwell Being could make the structure more accessible to a larger proportion of an already economically stressed population. The mortgage cost for Dwell Being currently with an FHA loan is almost \$20,000 down plus a monthly payment of almost \$1,000. This would require about a \$32K salary per year to meet the 30 percent rule. Even with multiple families in the duplex, this is inaccessible to many families in Jonestown. If Dwell Being were manufactured, the loan would be \$10,000

plus a monthly payment of almost \$500. Split by two families this is much closer to a 30 percent housing affordability budget with a required \$16K salary, which meets the median household income in Jonestown. Referencing Image 6 below, the curve was created using census data of household incomes in Jonestown. The vertical lines represent the 30 percent income threshold based on an entire year of mortgage payments. This then shows the percentage of families in Jonestown who can comfortably afford the home. The blue line represents the manufactured version of Dwell Being, and then green line represents the on site Dwell Being. The graph shows that by manufacturing the structure, only 22 percent of households in Jonestown do not have access, opposed to 41 percent when the structure is built on site.



Distribution of Household Income in Jonestown, MS

Figure 2: Distribution of household income in Jonestown, MI

Conclusion

Affordable housing is incredibly important to the livelihood of individuals and families. Most American families take housing for granted, however rising costs of living are making it increasingly difficult for individuals working low wage jobs to have consistence access to resources and standards of living. Manufactured housing is a realistic method to reduce housing costs and allow more individuals to have housing ownership. While manufactured housing is often associated with trailer park stereotypes, manufactured homes can actually be aesthetically pleasing and have personal touches to them. While the national average of manufactured homes is only at 6 percent, 15 percent of homes in Mississippi are manufactured, and 22 percent of homes in Jonestown are manufactured. This suggests that it would be easy to implement more manufactured homes into Jonestown and the surrounding area to give more people and more families access to housing. Access to more affordable housing would have broad and positive impacts that could lead to better health and education outcomes. According to the National Low Income Housing Coalition, housing is the key to reducing intergenerational poverty and increasing economic mobility. Further, access to housing is an effective strategy to reduce childhood poverty and increase economic mobility (The Problem). With such a high rate of poverty and high percentage of children under 18 in poverty, more access to housing in Jonestown would be incredibly beneficial.

Sources

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